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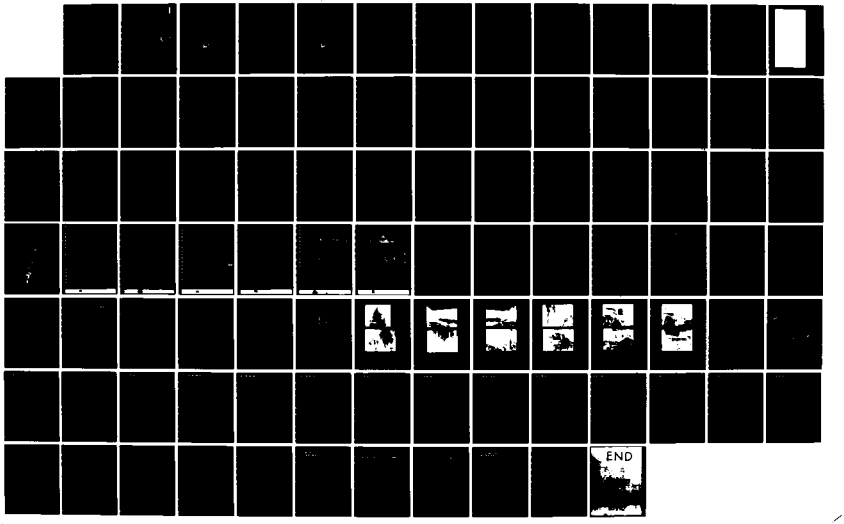

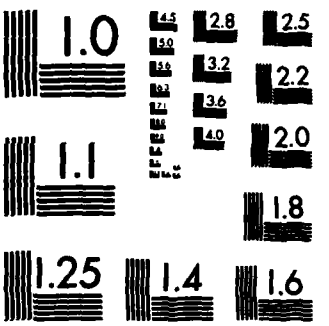

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CONNECTICUT COASTAL BASIN
WOLCOTT, CONNECTICUT

NEW BRITAIN RESERVOIR DAM
CT 00661

CONNECTICUT COASTAL BASIN
SOUTHINGTON, CONNECTICUT

NEW BRITAIN RESERVOIR DIKE
CT 00680

PHASE I INSPECTION REPORT
NATIONAL DAM INSPECTION PROGRAM

DEPARTMENT OF THE ARMY
NEW ENGLAND DIVISION, CORPS OF ENGINEERS
WALTHAM, MASS. 02154

AUGUST, 1979

UNCLASSIFIED

SECURITY CLASSIFICATION OF THIS PAGE (When Data Entered)

REPORT DOCUMENTATION PAGE		READ INSTRUCTIONS BEFORE COMPLETING FORM
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4. TITLE (and Subtitle) New Britain Reservoir Dam / Dike NATIONAL PROGRAM FOR INSPECTION OF NON-FEDERAL DAMS		5. TYPE OF REPORT & PERIOD COVERED INSPECTION REPORT 6. PERFORMING ORG. REPORT NUMBER
7. AUTHOR(s) U.S. ARMY CORPS OF ENGINEERS NEW ENGLAND DIVISION		8. CONTRACT OR GRANT NUMBER(s)
9. PERFORMING ORGANIZATION NAME AND ADDRESS		10. PROGRAM ELEMENT, PROJECT, TASK AREA & WORK UNIT NUMBERS
11. CONTROLLING OFFICE NAME AND ADDRESS DEPT. OF THE ARMY, CORPS OF ENGINEERS NEW ENGLAND DIVISION, NEDED 424 TRAPELO ROAD, WALTHAM, MA. 02254		12. REPORT DATE August 1979 13. NUMBER OF PAGES 70
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18. SUPPLEMENTARY NOTES

Cover program reads: Phase I Inspection Report, National Dam Inspection Program; however, the official title of the program is: National Program for Inspection of Non-Federal Dams; use cover date for date of report.

19. KEY WORDS (Continue on reverse side if necessary and identify by block number)

DAMS, INSPECTION, DAM SAFETY,

Connecticut Coastal Basin
Wolcott, Connecticut
Southington, Connecticut

20. ABSTRACT (Continue on reverse side if necessary and identify by block number)

The project consists of an earthfill dam, a spillway and an earthfill dike. The total length of the project is 760± feet. Both earthfill structures have a concrete corewall which is founded on bedrock. The heights of the dam and dike are 37± feet and 39± feet. Based upon the visual inspection at the site and past performance, the dam is judged to be in fair condition and the dike to be in poor condition. Due to The size (small) and hazard (high) classification of the project, the test flood will be equivalent to the PMF.

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CONNECTICUT COASTAL BASIN
WOLCOTT, CONNECTICUT

NEW BRITAIN RESERVOIR DAM
CT 00661

CONNECTICUT COASTAL BASIN
SOUTHINGTON, CONNECTICUT

NEW BRITAIN RESERVOIR DIKE
CT 00680

PHASE I INSPECTION REPORT
NATIONAL DAM INSPECTION PROGRAM

DEPARTMENT OF THE ARMY
NEW ENGLAND DIVISION, CORPS OF ENGINEERS
WALTHAM, MASS. 02154

AUGUST, 1979

BRIEF ASSESSMENT

PHASE I INSPECTION REPORT

NATIONAL PROGRAM OF INSPECTION OF DAMS

	DAM:	DIKE:
Name:	NEW BRITAIN RESERVOIR DAM	NEW BRITAIN RESERVOIR DIKE
Inventory Number:	00661	00680
State Located:	CONNECTICUT	CONNECTICUT
County Located:	NEW HAVEN	HARTFORD
Town Located:	WOLCOTT	SOUTHINGTON
Stream:	ROARING BROOK	
Owner:	NEW BRITAIN WATER COMPANY	
Date of Inspection:	MAY 4, 1979 AND JULY 16, 1979	
Inspection Team:	PETER M. HEYNEN, P.E. MIRON PETROVSKY GEORGE STEPHENS JAY COSTELLO	

The project, built in 1904, consists of an earthfill dam, a spillway and an earthfill dike. The total length of the project is 760± feet. Both earthfill structures have a concrete corewall which is founded on bedrock.

The 370± foot long dam and the 350± foot long dike are similar structures with a 15 foot wide crest and upstream and downstream slope inclinations of 2 horizontal to 1 vertical. The heights of the dam and dike are 37± feet and 39± feet, respectively, with the top of the concrete corewall at 3 feet below either crest. The dike, located approximately 800 feet northeast of the dam, has a dry laid stone retaining wall on the downstream slope.

The spillway, located 60± feet from the left side of the dam is a 30 foot long rubble masonry weir with a 12 to 16 inch thick concrete cover and concrete training walls. Stop-planks, 1.9 feet high, are installed on the weir crest with approximately 3 feet of freeboard from the stop-planks to the dam crest.

The outlet facilities are a 30 inch diameter low-level outlet and a gatehouse located on the downstream toe of the dam. The gate valve is operable.

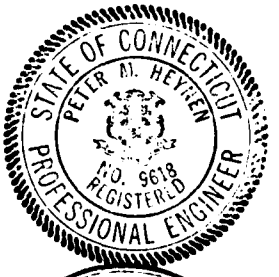
Based upon the visual inspection at the site and past performance, the dam is judged to be in fair condition and the dike to be in poor condition. No evidence of instability of the dam embankment or appurtenant structures was observed. There are areas requiring attention, maintenance and monitoring, such as seepage problems which may occur or may be occuring with the new water surface now to the top of the recently installed stop-planks, which is very close to or higher than the corewall. Also, severely deteriorated concrete at the spillway and seepage near the outlet structure are matters of concern. No evidence of instability of the dike embankment was observed. However, brush and trees on the crest and downstream slope could cause seepage through the embankment.

In accordance with Corps of Engineers Guidelines and the size (small) and hazard (high) classification of the project, the test flood will be equivalent to the Probable Maximum Flood (PMF). Peak inflow to the reservoir is 5300 cfs; peak outflow is 4800 cfs with the dam overtopped 1.7 feet and the dike overtopped 1.0 foot. The spillway capacity is 400 cubic feet per second (cfs) with the stop-planks installed, which is equivalent to 8% of the routed test flood outflow. The spillway capacity with the stop-planks removed is 1120 cfs or 23% of the routed test flood outflow.

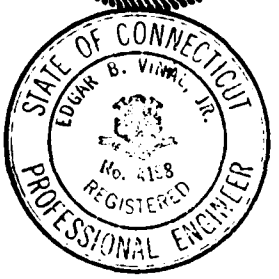
It is recommended that the owner retain the services of a registered professional engineer to perform a more detailed hydraulic/hydrologic analysis to determine the adequacy of the project discharge. Recommendations should be made by the engineer and implemented by the owner. Attention should be focused on immediate removal of the stop-planks until all remedial measures and recommendations are instituted, better maintenance, and rehabilitation of the concrete weir and training walls.

The above recommendations and any further remedial measures which are discussed in Section 7, should be instituted within one (1) year of the owner's receipt of this report.

Peter M. Heynen, P.E.
Project Manager
Cahn Engineers, Inc.



Edgar B. Vinal, Jr., P.E.
Senior Vice President
Cahn Engineers, Inc.



This Phase I Inspection Report on New Britain Reservoir Dam has been reviewed by the undersigned Review Board members. In our opinion, the reported findings, conclusions, and recommendations are consistent with the Recommended Guidelines for Safety Inspection of Dams, and with good engineering judgment and practice, and is hereby submitted for approval.

CHARLES G. TIERSCH, Chairman
Chief, Foundation and Materials Branch
Engineering Division

FRED J. RAVENS, Jr., Member
Chief, Design Branch
Engineering Division

SAUL C. COOPER, Member
Chief, Water Control Branch
Engineering Division

APPROVAL RECOMMENDED:

JOE B. FRYAR
Chief, Engineering Division

PREFACE

This report is prepared under guidance contained in the Recommended Guidelines for Safety Inspection of Dams, for Phase I Investigations. Copies of these guidelines may be obtained from the Office of Chief of Engineers, Washington, D.C. 20314. The purpose of a Phase I Investigation is to identify expeditiously those dams which may pose hazards to human life or property. The assessment of the general condition of the dam is based upon available data and visual inspection. Detailed investigation, and analyses involving topographic mapping, subsurface investigations, testing, and detailed computational evaluations are beyond the scope of a Phase I Investigation; however, the investigation is intended to identify any need for such studies.

In reviewing this report, it should be realized that the reported condition of the dam is based on observations of field conditions at the time of inspection along with data available to the inspection team. In cases where the reservoir was lowered or drained prior to inspection, such action, while improving the stability and safety of the dam, removes the normal load on the structure and may obscure certain conditions which might otherwise be detectable if inspected under the normal operating environment of the structure.

It is important to note that the condition of a dam depends on numerous and constantly changing internal and external conditions, and is evolutionary in nature. It would be incorrect to assume that the present condition of the dam would necessarily represent the condition of the dam at some point in the future. Only through continued care and inspection can there be any chance that unsafe conditions will be detected.

Phase I inspections are not intended to provide detailed hydrologic and hydraulic analyses. In accordance with the established Guidelines, the Spillway Test Flood is based on the estimated "Probable Maximum Flood" for the region (greatest reasonably possible storm runoff), or fractions thereof. Because of the magnitude and rarity of such a storm event, a finding that a spillway will not pass the test flood should not be interpreted as neccessarily posing a highly inadequate condition. The test flood provides a measure of relative spillway capacity and serves as an aid in determining the need for more detailed hydrologic and hydraulic studies, considering the size of the dam, its general condition and the downstream damage potential.

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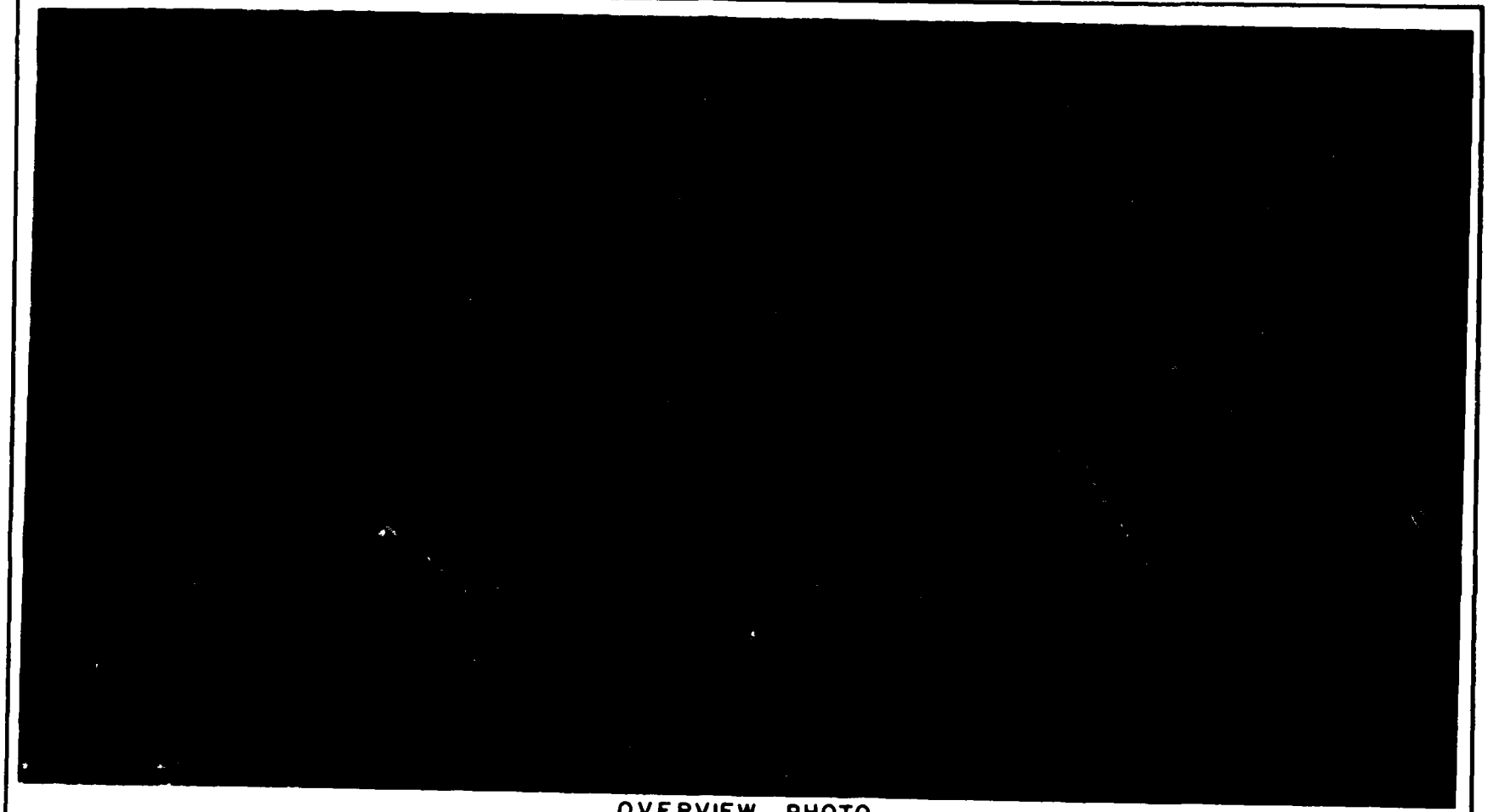
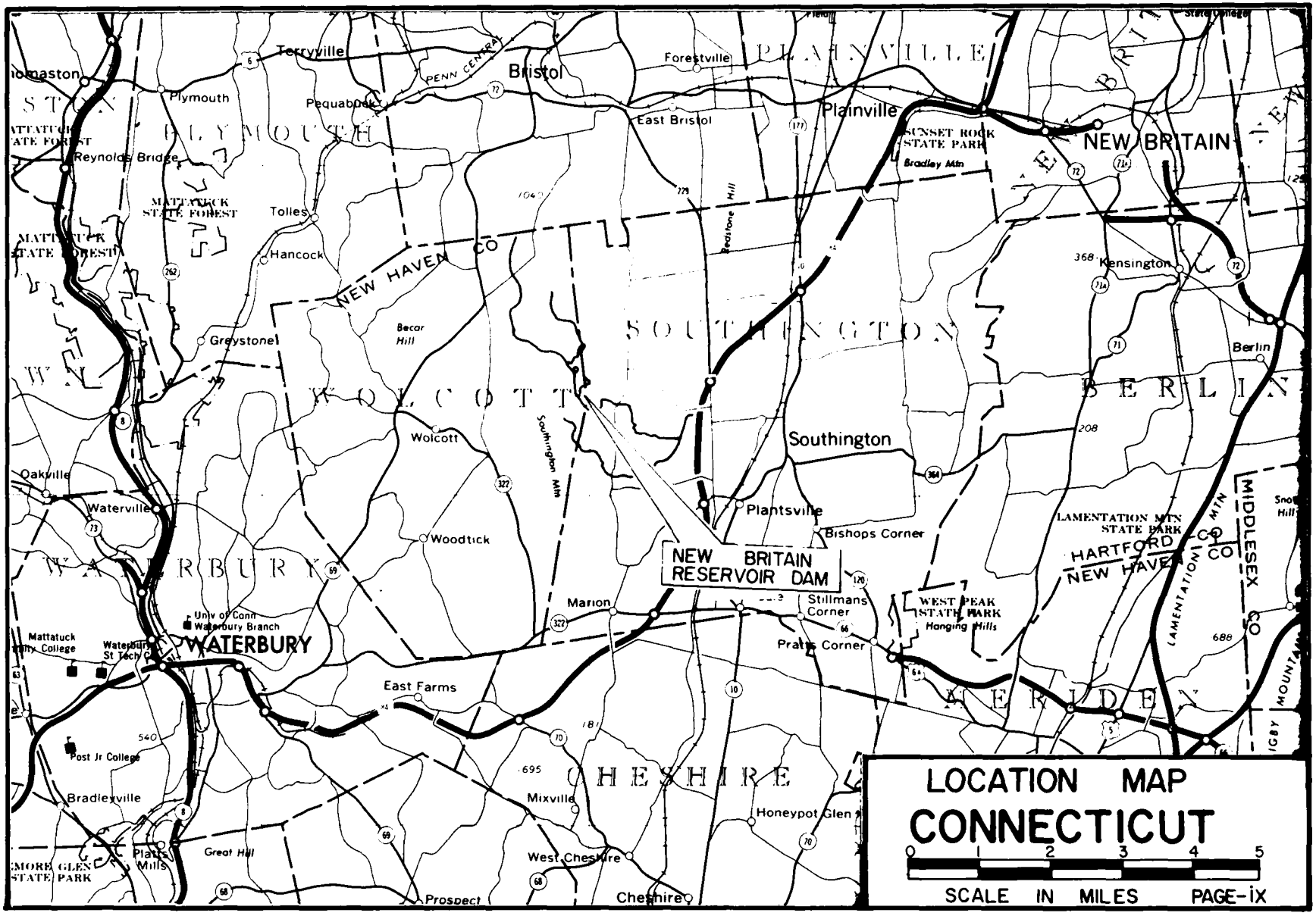
APPENDICES



OVERVIEW PHOTO

US ARMY ENGINEER DIV. NEW ENGLAND CORPS OF ENGINEERS WALTHAM, MASS.	NATIONAL PROGRAM OF	NEW BRITAIN RESERVOIR DAM	WOLCOTT	DATE MARCH 79
CAHN ENGINEERS INC. WALLINGFORD, CONN. ENGINEER	INSPECTION OF NON-FED DAMS	ROARING BROOK	CONNECTICUT	CE # 27660 KB PAGE viii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Bristol
Forestville
PLAINVILLE
Plymouth
Pequabuck
East Bristol
Plainville
NEW BRITAIN
SUNSET ROCK STATE PARK
Bradley Mtn
Reynolds Bridge
MATTATUCK STATE FOREST
Tolles
Hancock
Redstone Hill
NEW HAVEN CO
Kensington
Greystone
Bear Hill
SOUTHINGTON
Berlin
WOLCOTT
Wolcott
Southington Mtn
Southington
Oakville
Waterville
Woodtick
Plantsville
Bishops Corner
LAMENTATION MTN STATE PARK
HARTFORD CO
NEW HAVEN CO
MIDDLESEX CO
NEW BRITAIN RESERVOIR DAM
Marion
Stillmans Corner
WEST PEAK STATE PARK
Hanging Hills
Pratts Corner
Univ of Conn Waterbury Branch
Mattatuck Comm College
Waterbury St Tech C
WATERBURY
East Farms
Post Jr College
Bradleyville
Mixville
Honeypot Glen
Great Hill
Platts Mills
West Cheshire
Prospect
Cheshire
LOCATION MAP
CONNECTICUT
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SCALE IN MILES

PHASE I INSPECTION REPORT

NEW BRITAIN RESERVOIR DAM

SECTION I - PROJECT INFORMATION

1.1 GENERAL

a. Authority - Public Law 92-367, August 8, 1972, authorized the Secretary of the Army, through the Corps of Engineers, to initiate a National Program of Dam Inspection throughout the United States. The New England Division of the Corps of Engineers has been assigned the responsibility of supervising the inspection of dams within the New England Region. Cahn Engineers, Inc. has been retained by the New England Division to inspect and report on selected dams in the State issued to Cahn Engineers, Inc. under a letter of March 30, 1979 from John P. Chandler, Colonel, Corps of Engineers, Contract No. 33-79-C-0059 has been assigned by the Corps of Engineers for this work.

b. Purpose of Inspection Program - The purposes of the program are to:

1. Perform technical inspection and evaluation of non-federal dams to identify conditions requiring correction in a timely manner by non-federal interests.

2. Encourage and prepare the States to quickly initiate effective dam inspection programs for non-federal dams.

3. To update, verify and complete the National Inventory of Dams.

c. Scope of Inspection Program - The scope of this Phase I inspection report includes:

1. Gathering, reviewing and presenting all available data as can be obtained from the owners, previous owners, the state and other associated parties.

2. A field inspection of the facility detailing the visual condition of the dam, embankments and appurtenant structures.

3. Computations concerning the hydraulics and hydrology of the facility and its relationship to the calculated flood through the existing spillway.

4. An assessment of the condition of the facility and corrective measures required.

It should be noted that this report does not pass judgement on the safety or stability of the dam other than on a visual basis. The inspection is to identify those features of the dam which need corrective action and/or further study.

1.2 DESCRIPTION OF PROJECT

a. Location - The dam is located on Roaring Brook in a rural area of the town of Wolcott, County of New Haven, State of Connecticut. The dam is shown on the Southington USGS Quadrangle Map having coordinates latitude N 41°36.5' and longitude W 72°56.1'.

- The dike is located 800 feet northeast of the dam on a swale at the beginning of an unnamed brook in a rural area of the town of Southington, County of Hartford, State of Connecticut. The dike is shown on the Southington USGS Quadrangle Map.

b. Description of Dam and Appurtenances - The dam is an earthfill embankment with a concrete corewall, spillway and an earth dike with a concrete corewall located approximately 800 feet northeast of the dam. All structures are founded on firm bedrock.

The dam is approximately 370 feet long and 15 feet wide at a top elevation of 770.4, which is 37 feet above the streambed of Roaring Brook. The corewall is approximately 360 feet long and is aligned along the axis of the dam at 3 feet below the crest. The upstream and downstream slopes are inclined at 2 horizontal to 1 vertical. The upstream slope is surfaced with riprap from the toe to 1.5 feet below the dam crest, and is underlain by 8 inches of crushed stone. The crest and downstream slope have a grass cover.

The spillway consists of a 30 foot long concrete capped rubble masonry weir with 3 foot high concrete training walls and a spillway channel excavated from a large outcrop of bedrock on the left end of the dam. The spillway crest is at elevation 765.9, or 5 feet below the top of the dam, and has stop-planks installed to 1.9 feet above crest of the weir.

The dike, similar in construction to the dam and at elevation 771.1 at the top, is approximately 350 feet in length and 39 feet in height, with a concrete corewall along the axis. The upstream and downstream slopes are 2 horizontal to 1 vertical. Riprap protection is used on the upstream slope with a grass cover on the crest and downstream slope. A dry laid stone retaining wall approximately 65 feet in length is located on the left side of the downstream slope.

The dam outlet is a 30 inch cast iron low level outlet with stone masonry inlet and outlet structures. The outlet is operated from the brick gatehouse at the downstream toe of the main embankment.

c. Size Classification

Dam and Dike: (SMALL) - The dam and dike impound 520 acre-feet of water with the reservoir level at the top of the dam which at elevation 770.9, is 37' above the old streambed. According to the Recommended Guidelines, the project is classified as small.

d. Hazard Classification

Dam: HIGH - If the dam were to be breached, there is potential for loss of life and extensive property damage at seven residences on the newly constructed Roaring Brook Drive and at several residences on Mount Vernon Road, both of which are approximately 3000 feet downstream and very close to the streambed of Roaring Brook.

Dike: HIGH - If the dike were to be breached, there is potential for loss of life and extensive property damage at 17 residences on Ciccio Road and Mount Vernon Road, 2500 feet downstream from the dike. Also there is a large housing development situated in a low area approximately 6000 feet downstream of both the dam and dike which would probably be subjected to flooding.

e. Ownership - New Britain Water Company
Main Street,
New Britain, Conn
Mr. Jack McMannus (203) 224-2491

f. Operator - Ronald Baccatri (203) 876-0706

g. Purpose - Water Supply

h. Design and Construction History - The following information is believed to be accurate based on the plans and correspondence available. The dam and dike were designed and constructed in the period between 1901 and 1904 by the New Britain Water Company. According to the Operator, new stoplanks approximately 1.9 feet high were constructed in 1977 to replace deteriorating flashboards.

i. Normal Operational Procedures - The valve for the low-level outlet is operated at least twice a year to allow draining and filling of the reservoir. The valve is also operated to allow water to flow downstream to a small dam and valve house where water is retained for augmentation to storage in the Wasel and Shuttle Meadow Reservoirs. The reservoir water level is normally maintained at elevation 765±.

1.3 PERTINENT DATA

a. Drainage Area - 2.5 square miles of moderately steep, relatively undeveloped, wooded terrain.

b. Discharge at Damsite - Discharge is from over the spillway and through the 30" low-level outlet located at the central part of the dam.

1. Outlet works (conduits):

30" low level outlet @ invert el. 734.9±:	120 cfs
2. Maximum known flood @ damsite:	Unknown
3. Ungated spillway capacity @ top of dam el. 770.4±:	400 cfs
4. Ungated spillway capacity @ test flood el. 772.1±:	960 cfs
5. Gated spillway capacity @ normal pool el.:	N/A
6. Gated spillway capacity @ test flood el.:	N/A
7. Total spillway capacity @ test flood el. 772.1:	960 cfs
8. Total project discharge @ test flood el. 772.1:	4800 cfs

c. Elevations (Feet Above Mean Sea Level)

1. Streambed:	734.9±
2. Maximum tailwater:	N/A
3. Upstream portal invert diversion tunnel:	N/A
4. Recreation pool:	N/A
5. Full flood control pool:	N/A

6. spillway crest (ungated):	765.9± (weir) 767.8± (stop-planks)
7. Design surcharge (original design):	N/A
8. Top of Dam:	design - 770.9± existing - 770.4±
9. Top of Dike:	design - 770.9± existing - 771.1±
10. Test flood design surcharge:	N/A

d. Reservoir

1. Length of maximum pool:	4000 ft.
2. Length of recreation pool:	N/A
3. Length of flood control pool:	N/A

e. Storage

1. Recreation pool:	N/A
2. Flood control pool:	N/A
3. Spillway crest pool:	520 acre-ft.
4. Top of dam:	700 acre-ft.
5. Test flood pool:	780 acre-ft.

f. Reservoir Surface

1. Recreation pool:	N/A
2. Flood control pool:	N/A
3. Spillway crest:	55 acres
4. Top of dam:	64 acres
5. Test flood pool:	70 acres

g. Dam

1. Type:	Earth embankment

2. Length:	370 ft.
3. Height:	37 ft.
4. Top width:	15 ft.
5. Side slopes:	2H to 1V Upstream 2H to 1V Downstream
6. Zoning:	N/A
7. Impervious Core:	Concrete Corewall
8. Cutoff:	N/A
9. Grout curtain:	N/A
10. Other	N/A

Dike

1. Type:	Earth embankment
2. Length:	350 ft.
3. Height:	39 ft.
4. Top width:	15 ft.
5. Side slopes:	2H to 1V Upstream 2H to 1V Downstream
6. Zoning:	N/A
7. Impervious Core:	Concrete Corewall
8. Cutoff:	N/A
9. Grout curtain:	N/A
10. Other:	65 foot Stone retaining wall at left downstream toe

h. Diversion and Regulatory Tunnel - N/A

i. Spillway

1. Type:	Concrete ogee weir with 1.9 foot stop-planks
2. Length of weir:	30 ft.

3. Crest el.:	765.9± (weir) 767.8± (stop-planks)
4. Gates:	N/A
5. Upstream Channel:	Natural lake bottom
6. Downstream Channel:	Rock
7. General:	Spillway and channel excavated from bedrock

j. Regulating Outlets - The only regulating outlet is the 30 inch pipe located at the central part of the dam and operated at the gatehouse.

1. Invert:	734.9
2. Size:	30"
3. Description:	Cast iron
4. Control Mechanism:	Hand operated floor stand
5. Other:	N/A

SECTION 2: ENGINEERING DATA

2.1 DESIGN

a. Available Data - The available data consists of design drawings dated 1903 and "as-built" drawings dated 1904 by Percy M. Blake for the New Britain Water Company. There is also correspondence from the New Britain Water Company, the State of Connecticut Water Resources Commission and Cahn Engineers, Inc.

b. Design Features - The 1903 drawings indicate design features and the 1904 drawings indicate actual conditions.

c. Design Data - There were no engineering values, assumptions, test results or calculations available for the original design.

2.2 CONSTRUCTION

a. Available Data - Although the available plans are not titled "as-built" drawings, they are a reasonable representation of the project features as constructed.

b. Construction Considerations - No information was available.

2.3 OPERATIONS

Lake level readings are taken daily except on weekends and during winter months when they are taken every 2 to 3 weeks. The owner reported that the dam spillway capacity has never been exceeded. No formal operations records are known to exist.

2.4 EVALUATION

a. Availability - Existing data was provided by the New Britain Water Company and the State of Connecticut Water Resources Commission. The owner made the operations available for visual inspection.

b. Adequacy - The limited amount of detailed engineering data available was generally inadequate to perform an in-depth assessment of the dam, therefore, the final assessment of this dam must be based primarily on visual inspection, performance history, hydraulic computations of spillway capacity and approximate hydrologic judgements.

c. Validity - Although no drawings are titled "as-built", the drawings dated 1903 seem to be design plans and drawings dated 1904 indicate as-built conditions. Some features indicated on the design plans could not be identified during field inspections. No evidence could be found to prove the existence of a drainage gutter or retaining wall on the downstream toe of the dam, just above the gatehouse. Also, no evidence of a 6 inch cast iron drain pipe out of the gatehouse could be found. Elevations of the top of both the dike and dam were not as indicated in existing plans (See Section 3.1.b and Sheet B-4).

SECTION 3: VISUAL INSPECTION

3.1 FINDINGS

a. General - The general condition of the project is fair. Inspection did reveal some areas requiring maintenance and monitoring. The reservoir level was 767.9± (May 4, 1979) and 760.5± (July 16, 1979) at the time of our inspections and the weather was sunny and dry.

b. Dam - The dam is considered to be generally in fair condition and consists of an earth embankment and concrete corewall.

Crest - The 15 foot wide crest has a grass cover that has been eroded by trespassing vehicles. There are ruts of several inches in depth and almost complete deterioration of the grass cover. No misalignment, visible depressions or cracks were observed in the crest. However, an erosion area filled with water was noted on the top of the dam near the right abutment (Photo 1) and the upstream side of the right abutment has a substantial eroded area probably caused by storm runoff (Photo 2).

The first inspection (May 4, 1979) revealed that the freeboard to the top of the dam was smaller than to the top of the dike. The subsequent rough topographic survey (July 16, 1979) showed the elevations of the top of the dam and the dike were approximately 770.4 and 771.1, respectively, as opposed to the design elevations of 770.9. From these figures it is evident that the top of the dam is 0.7 feet lower relative to the top of the dike and 0.5 feet lower than the design elevations.

Upstream Slope - The slope inclination is 2 horizontal to 1 vertical and protection is 18 inch thick stone paving to approximately 1 to 2 feet below the top of the dam. The paving does not have any visible displacement or areas needing replacement, although there is some vegetation between the stones (Photo 3). A pine tree of 12 to 15 inches in diameter was noted at the left end of the embankment.

Downstream Slope - The downstream slope of the dam, with an inclination of 2 horizontal to 1 vertical, has a grass cover protection. Plans indicate the toe of the dam probably has a drainage system leading to the tile outlet pipe which is located near the right side of the masonry outlet headwall below the gatehouse.

No misalignments, cracks or seepage was observed on the downstream slope of the embankment.

Erosion, caused by motorcycles, approximately 2 foot wide and 1 foot deep was noted on the dam slope just upstream from the gatehouse (Photo 4). A considerable area of this slope and toe is covered with brush and trees, some of which are 10 to 12 inches in diameter.

The 6 inch drain pipe outlet directed toward the toe of the dam had a measured flow range from 4 to 5 gallons per minute. The water was clear but some deposits of brown fine silt were observed near the outlet (Photo 7).

Dike - The dike appears to be in poor condition and consists of an earth embankment, concrete corewall and a stone retaining wall.

Crest - The crest of the dike is 15 feet wide and has a grass cover. The grass cover however, has been overgrown by heavy brush and small trees, leaving an open path of only 4 to 5 feet wide.

Upstream Slope - The slope inclination is 2 horizontal to 1 vertical with stone paving to approximately 1 to 2 feet below the crest. The stone paving does not have any visible displacement or areas needing replacement, although there is some vegetation between the stones. Also, the top of the slope, just above the paving, is overgrown by trees and brush (Photo 5).

Downstream Slope - The downstream slope has an inclination of 2 horizontal to 1 vertical and has a grass cover which is overgrown with weeds, brush and large trees up to 12 inches in diameter. The stone retaining wall shows some signs of deterioration with various types of vegetation growing between the stones (Photo 6) (See Sheet B-3).

Spillway - The spillway is located on the left end of the dam and is considered to be in poor condition. The 30 foot long and 4 foot high weir is a stone masonry structure faced with 12 to 16 inch thick concrete. The concrete spillway training walls are adjoined to a natural rock formation. Stop-planks, 1.9 feet in height, were installed on the spillway weir nearly two years ago. At that time, the spillway weir and the training walls had been patched to repair cracking.

The inspections disclosed considerable damage to the spillway. The spillway weir had cracks, exposed aggregate on the downstream face and erosion of concrete at the base of the wier (Photo 12). Cracking and spalling of the concrete with lime deposits and wet areas were observed on both training walls (Photos 9 and 10). Some cracks were large and probably extended the width of the concrete to the bedrock abutment.

The left spillway training wall was the most deteriorated and had a wash-out of nearly 2 feet in height at the base of the downstream end (Photo 9). This part of the wall is losing support, causing several horizontal cracks about 6 feet above the spillway channel. An unstable area with several loose boulders was noted in the left abutment above the downstream end of the training wall. Several boulders were noted in the spillway channel probably from this zone (Photos 11 and 12).

The spillway had some obstructions in the discharge channel in the form of large boulders and trees (Photos 11 and 12).

c. Appurtenant Structures - The appurtenant structures of the dam are a gatehouse, a stone masonry headwall with a 30 inch diameter low-level outlet, and a discharge channel. The valve for the low-level outlet is in the gate house on the downstream side of the dam. No other means of controlling flow through the 30 inch outlet was evident.

The gatehouse is in good condition. No cracks or spalling of the brick walls were observed. Several cracks in the mortar joints and lime deposits along the joints were noted on the headwall (Photo 8). There were also several wet areas under the joints on the lower portion of the headwall.

There was seepage and wet areas on both sides of the outlet discharge channel. One such area is located just downstream of the tile drain pipe outlet. It extends 10 to 15 feet and has a estimated total flow rate of 3 to 5 gallons per minute. A small amount of brown silt was observed at the wet area on the right side of outlet channel. The second area is on the left side of the channel at a distance of 10 to 12 feet from the end of the masonry wing wall. This area has a length of 6 to 9 feet. The origin of these wet areas appears to be connected with seepage through the main embankment.

The outlet channel is the old natural stream with flat slopes. There are numerous stones, some boulders and dead trees in the channel (Photo 8).

d. Reservoir Area - The shoreline surrounding the pond is heavily wooded and largely undeveloped. There is a service road to the dam site on the west side of the reservoir. A large gully has formed in this road exposing a drain pipe and prohibiting easy access to the dam.

e. Downstream Channel - The downstream channel is mostly undeveloped, steep-sided and wooded to the initial impact area.

3.2 EVALUATION

Based upon the visual inspection, the project was assessed as being generally in fair condition. The dam itself is in fair condition and the dike and spillway conditions are generally poor. The following features which could influence the future condition and/or stability of the project were identified.

1. Further deterioration of the crest, the downstream slope and the right abutment of the dam by vehicles, foot traffic and storm runoff could lead to extensive erosion and eventual weakening of the dam.

2. Heavy brush and trees on the crest, upstream and downstream slopes of the dam and dike impede monitoring, accumulate moisture and could increase seepage in the project and will cause extensive damage if trees overturn during strong winds and/or hurricane conditions.

3. Although, at the present time the seepage through the embankment appears to be stable, it could intensify and compromise the stability of the dam.

4. Because of stop-plank installation on the spillway crest, which was not part of the original design, the phreatic surface in the dam body could be higher than the concrete corewall, causing an increase in seepage and saturation of the dam, leading to reduction in stability. The stop-planks are also causing a reduction in spillway capacity which could lead to overtopping and erosion of the dam.

5. The elevation of the top of the dam is approximately 0.7 feet lower than the top of the dike. Therefore, any hydraulic calculations should take this into account.

6. Cracking and spalling of concrete at the spillway weir and the wash-out of the spillway training walls could lead to accelerating deterioration and possible failure of the spillway weir.

7. The valve for the 30 inch low level outlet is located on the downstream side of the dam. This could lead to seepage and stability problems caused by high pressure in the pipe.

SECTION 4: OPERATIONAL PROCEDURES

4.1 REGULATING PROCEDURES

Flows out of the reservoir are increased in the spring to increase project discharge and to allow drawdown of the reservoir level. The valve is then shut almost completely during summer months to allow filling of the reservoir. The valve is also opened periodically for augmentation of storage to Wasel Reservoir and Shuttle Meadow Reservoir. During the warmer seasons, reservoir level readings are taken daily during the working week. In the winter, readings are taken every 2-3 weeks.

4.2 MAINTENANCE OF DAM AND DIKE

The grass is cut and brush removed about twice a year on the dam embankment. No maintenance is performed on the dike.

Maintenance and repairs are done by the New Britain Water Company. No regular inspection schedule is known to exist for either the dike or the dam.

4.3 MAINTENANCE OF OPERATING FACILITES

Maintenance consists of greasing the floor stand and opening the valve several times a year.

4.4 DESCRIPTION OF ANY FORMAL WARNING SYSTEM IN EFFECT

No formal warning system is in effect.

4.5 EVALUATION

The operation and maintenance procedures require improvement. A formal program of operation and maintenance procedures should be implemented, including documentation to provide complete records for future reference. Also, a formal warning system should be developed and implemented within the time frame indicated in Section 7.1c. Remedial operation and maintenance recommendations are presented in Section 7.

SECTION 5: HYDRAULIC/HYDROLOGIC

5.1 EVALUATION OF FEATURES

a. General - The project is basically a low surcharge storage - high spillage earth embankment. The drainage area is small and the terrain surrounding the project is fairly steep. The dam is 0.7 feet lower than the dike which is located approximately 800 feet northeast of the dam.

b. Design Data - No computations are available for the original construction or any subsequent modifications.

c. Experience Data - No information on serious problem situations arising at the dam were found, and it was reported that the dam has never been overtopped.

d. Visual Observations - Several small trees and large boulders were observed in the spillway channel. Also, logs and boulders were found in the outlet discharge channel.

e. Test Flood Analysis - The test flood for this high hazard, small size dam is equivalent to the Probable Maximum Flood (PMF) of 5300 cubic feet per second (cfs), which is also equivalent to the peak inflow to the reservoir (Appendix D-5). Peak outflow is 4800 cfs with the dam overtopped 1.7 feet and the dike overtopped 1.0 foot (Appendix D-5). Based upon our hydraulics computations, the spillway capacity is 400 cfs with the stop-planks installed and 1120 cfs with the stop-planks removed, which is 8% and 23% of the routed test flood outflow respectively.

f. Dam Failure Analysis - Utilizing the April, 1978, "Rule of Thumb Guidance for Estimating Downstream Failure Hydrographs", the peak outflow at the dam before failure would be 4800 cfs and the peak failure outflow from the dam breaching would be 36,300 cfs. The initial impact area for the dam is approximately 3000 feet downstream at Roaring Brook Drive and Mount Vernon Road, and a breach in the dam would result in a rise of 16.5 feet in the water level at the initial impact area, which corresponds to an increase in the water from a depth of 3.7 feet just before the breach, to a depth of 20.2 feet just after the breach. There would be little or no damage due to discharge before the breach, but the rapid 16.5 foot increase in water level at the initial impact area would inundate at least 7 houses to a depth of 7 feet.

Peak failure outflow for the dike would be 8,200 cfs and would result in rise of 7.1 feet in the water level at the initial impact area, which is approximately 2500 feet downstream from the dike at Ciccio Road and Mount Vernon Road. There is no discharge at the dike before failure of the dike but if a breach should occur, the 7.1 foot increase in water level at the initial impact area would inundate 12 houses to a depth of 4 feet.

After crossing Mount Vernon Road, the terrain becomes low and flat, which would cause flood waters to spread out and lose momentum. Damage downstream from the initial impact areas would probably be minimum.

SECTION 6: STRUCTURAL STABILITY

6.1 EVALUATION OF STRUCTURAL STABILITY

a. Visual Observations - The visual inspections did not reveal any indications of stability problems. There are areas of seepage at the outlet channel and erosion of the crest and downstream slope of the dam embankment. Deterioration of the spillway concrete could quite possibly endanger the future safety and stability of the dam. Additional seepage problems may occur due to the higher reservoir level resulting from stop-plank installation.

b. Design and Construction Data - There is not enough design and construction data available to permit an in-depth assessment of the structural stability of the project.

c. Operating Records - The operating records available do not include any indications of instability of the dam or dike since construction in 1904.

d. Post Construction Changes - There are no records available concerning the post-construction changes of the project. According to the operator, previous stop-planks on the spillway crest were replaced in 1977. The new stop-planks are 1.9 feet above the weir crest.

e. Seismic Stability - The project is in Seismic Zone 1 and according to the Recommended Guidelines and need not be evaluated for Seismic Stability.

SECTION 7: ASSESSMENT, RECOMMENDATIONS AND REMEDIAL MEASURES

7.1 PROJECT ASSESSMENT

a. Condition - Based upon the visual inspection of the site and its past performance, the project appears to be in fair condition. No evidence of structural instability was observed in the dam, dike or appurtent structures. The dam embankment is generally in fair condition with erosion of the crest, the right abutment and the downstream slope, seepage at the outlet channel and the possibility of seepage over the top of the concrete corewall. The dike embankment is in fair condition but trees and brush may cause seepage problems in the future. Other areas of concern include the deterioration of the spillway concrete, the spillway capacity and the lack of scheduled and continuous maintenance.

Based upon "Preliminary Guidance for Estimating Maximum Probably Discharge" dated March, 1978, peak inflow to the reservoir is 5300 cubic feet per second; peak outflow (Test flood) is 4800 cubic feet per second with the dam and dike overtopped. Based upon our hydraulics computations, the spillway capacity is 400 cfs with the stop-planks installed, which is equivalent to approximately 8% of the routed Test Flood outflow.

b. Adequacy of Information - The information available is such that an assessment of the condition and stability of the project must be based solely on visual inspection, past performance, and sound engineering judgement.

c. Urgency - It is recommended that the measures presented in Section 7.2 and 7.3 be implemented within one year of the owner's receipt of this report.

d. Need for Additional Information - There is a need for more information as recommended in Section 7.2.

7.2 RECOMMENDATIONS

It is recommended that further studies be made by a registered professional engineer qualified in dam design and inspection pertaining to the following:

1. A detailed hydraulic/hydrologic analysis should be performed to determine the adequacy of the project discharge. Recommendations should be made by the engineer and implemented by the owner.

2. Inspection of the dam in warm and cold seasons, and during times of high and low head to determine if seepage is indeed coming through the dam from the reservoir and not from some other source. The engineer should also make any necessary recommendations. Items of particular importance are as follows:

a. Evaluation of the dam condition when the reservoir level is near or higher than the top of the concrete corewall. Installation of piezometers upstream and downstream of the corewall is desireable for determination of the phreatic surface in the body of the dam.

b. The origin and significance of seepage at the outlet discharge channel from the tile drain pipe and the slopes of the channel.

c. Restoration of the spillway concrete and spillway left abutment where a large portion of the rock walls are cracking, breaking loose, and falling into the spillway channel.

d. Removing the large trees from the slopes and downstream toe of the dam and dike.

e. The engineer should investigate the possibilities for installation of valves on the upstream side of the dam so as to eliminate pressures in the outlet when the valve is closed.

7.3 REMEDIAL MEASURES

a. Operation and Maintenance Procedures - The following measures should be undertaken within the time frame indicated in Section 7.1.c, and continued on a regular basis.

1. Round-the-clock surveillance should be provided by the owner during periods of unusually heavy precipitation. The owner should develop a downstream warning system in case of emergencies at the dam.

2. A formal program of operation and maintenance procedures should be instituted and fully documented to provide accurate records for future reference.

3. A program of inspection by a registered, professional engineer qualified in dam inspection should be instituted on an annual basis. The inspections should be comprehensive in nature and should include the operation of the low level outlet works.

4. Deteriorated crest of the dam should be repaired and paving for vehicle use should be placed or vehicular traffic completely restricted.

5. Erosion areas on the downstream slope and the right abutments of the dam should be filled and slope protection placed.

6. Brush on the crest, the upstream and downstream slopes and the toe of the dam and dike should be removed. The cutting of grass on these areas of the dam and dike should be continued as part of the routine maintenance.

7. Seepage at the outlet discharge channel and from the tile drain pipe outlet should be monitored periodically for measurement of flow rate.

8. Vegetation should be removed from the stone masonry retaining wall at the toe of the dike and repairs made as necessary.

9. Cracking and spalling of concrete at the spillway weir and training walls should be repaired. The wash-out of the left training wall should be repaired with new concrete and unstable zones of rock on the abutments of this wall should be removed.

10. Mortar joints with moisture and efflorescence at the outlet headwall should be sealed.

11. All obstructions on the floor of the spillway and outlet channels should be removed.

12. Trespassing on the dam, dike and surrounding land should be eliminated with strict prohibitive measures.

13. The gulley and drainage pipe on the service road should be repaired so as to allow safer access to the project.

14. Immediate removal of the stop-planks until all recommendations and remedial measures have been implemented.

7.4 ALTERNATIVES

This study has identified no practical alternatives to the above recommendations.

APPENDIX A

INSPECTION CHECKLIST

VISUAL INSPECTION CHECK LIST

PARTY ORGANIZATION

PROJECT New Britain Reservoir Dam

DATE: May 4 and July 16, 1979

TIME: 10:30 p.m.

WEATHER: Sunny, 70-80°F

W.S. ELEV. 767.9± (May, '79) U.S.
760.5± (July, '79) U.S.

PARTY:	INITIALS:	DISCIPLINE:
1. Peter M. Heynen	PMH	Cahn Engineers, Inc.
2. Miron Petrovsky	MP	Cahn Engineers, Inc
3. George Stephens	GS	Cahn Engineers, Inc.
4. Jay Costello	JC	Cahn Engineers, Inc.
5. Ronald Buccatri (Owner Representative)		New Britain Water Co.
6.		

	PROJECT FEATURE	INSPECTED BY	REMARKS
1.	Main Embankment	PMH, MP, GS, JC	
2.	Dike	PMH, MP, GS, JC	
3.	Concrete Spillway	PMH, MP, GS, JC	
4.	Gate House	PMH, MP, JC	
5.	Low Level Outlet	PMH, MP, JC	
6.			
7.			
8.			
9.			
10.			
11.			
12.			

PERIODIC INSPECTION CHECK LIST

PROJECT New Britain Reservoir Dam DATE May 4 and July 6, 1971

PROJECT FEATURE Earthfill Main Embankment with concrete Corewall BY PMH, MPGS, JC

AREA EVALUATED		CONDITION
DAM EMBANKMENT		
Crest Elevation		770.4±
Current Pool Elevation		767.9±
Maximum Impoundment to Date		Unknown
Surface Cracks		None observed
Pavement Condition		Crest damaged by trespassing
Movement or Settlement of Crest		None observed
Lateral Movement		
Vertical Alignment		Appears good
Horizontal Alignment		
Condition at Abutment and at Concrete Structures		Major Erosion at right abutment
Indications of Movement of Structural Items on Slopes		None observed
Trespassing on Slopes		Some
Sloughing or Erosion of Slopes or Abutments		Erosion area on d/s slope
Rock Slope Protection-Riprap Failures		Grass between riprap stones
Unusual Movement or Cracking at or Near Toes		None observed
Unusual Embankment or Downstream Seepage		Seepage and wet areas at d/s toe
Piping or Boils		None observed
Foundation Drainage Features		Unknown
Toe Drains		Unknown- 6" tile drain pipe with rate of 4-5 gal/min.
Instrumentation System		N/A

PERIODIC INSPECTION CHECK LIST

PROJECT New Britain Reservoir Dam DATE May 4 and July 16, 1979

PROJECT FEATURE Earthfill Dike with Concrete Coremall BY PMH, MP, GS, JC

AREA EVALUATED		CONDITION
DIKE EMBANKMENT		
Crest Elevation		771.1 ±
Current Pool Elevation		767.9 ±
Maximum Impoundment to Date		Unknown
Surface Cracks		None observed
Pavement Condition		Heavy vegetation
Movement or Settlement of Crest		None observed
Lateral Movement		
Vertical Alignment		Appears good
Horizontal Alignment		
Condition at Abutment and at Concrete Structures		Dry masonry retaining wall on d/s slope with open joints
Indications of Movement of Structural Items on Slopes		None observed
Sloughing or Erosion of Slopes or Abutments		
Rock Slope Protection-Riprap Failures		Grass between riprap stones
Unusual Movement or Cracking at or Near Toes		None observed
Unusual Embankment or Downstream Seepage		
Piping or Boils		
Foundation Drainage Features		N/A
Toe Drains		
Instrumentation System		
Trespassing on Slopes		Some

PERIODIC INSPECTION CHECK LIST

PROJECT New Britain Reservoir Dam DATE May 4 and July 16, 1979

PROJECT FEATURE Gate House BY PMH, JC

AREA EVALUATED		CONDITION
OUTLET WORKS-CONTROL TOWER		Brick structure on d/s toe of main embankment
a) Concrete and Structural		
General Condition		Good
Condition of Joints		Not observed
Spalling		None observed
Visible Reinforcing		
Rusting or Staining of Concrete		N/A
Any Seepage or Efflorescence		None observed
Joint Alignment		Not observed
Unusual Seepage or Leaks in Gate Chamber		None observed
Cracks		
Rusting or Corrosion of Steel		
b) Mechanical and Electrical		
Air Vents		N/A
Float Wells		
Crane Hoist		
Elevator		
Hydraulic System		
Service Gates		30" gate valve, operable
Emergency Gates		N/A
Lightning Protection System		
Emergency Power System		
Wiring and Lighting System		

PERIODIC INSPECTION CHECK LIST

PROJECT New Britain Reservoir Dam DATE May 4 and July 16, 1979

PROJECT FEATURE Low Level Outlet BY PMH, MP, GS, JC

AREA EVALUATED	CONDITION
OUTLET WORKS-OUTLET STRUCTURE AND OUTLET CHANNEL	Masonry Headwall
General Condition of Masonry	Fair
Rust or Staining	None observed
Spalling	N/A
Erosion or Cavitation	None observed
Visible Reinforcing	
Any Seepage or Efflorescence	Seepage and efflorescence along joints
Condition at Joints	some cracking
Drain Holes	Unknown
Channel	
Loose Rock or Trees Overhanging Channel	some trees
Condition of Discharge Channel	Boulders & logs in channel

PERIODIC INSPECTION CHECK LIST

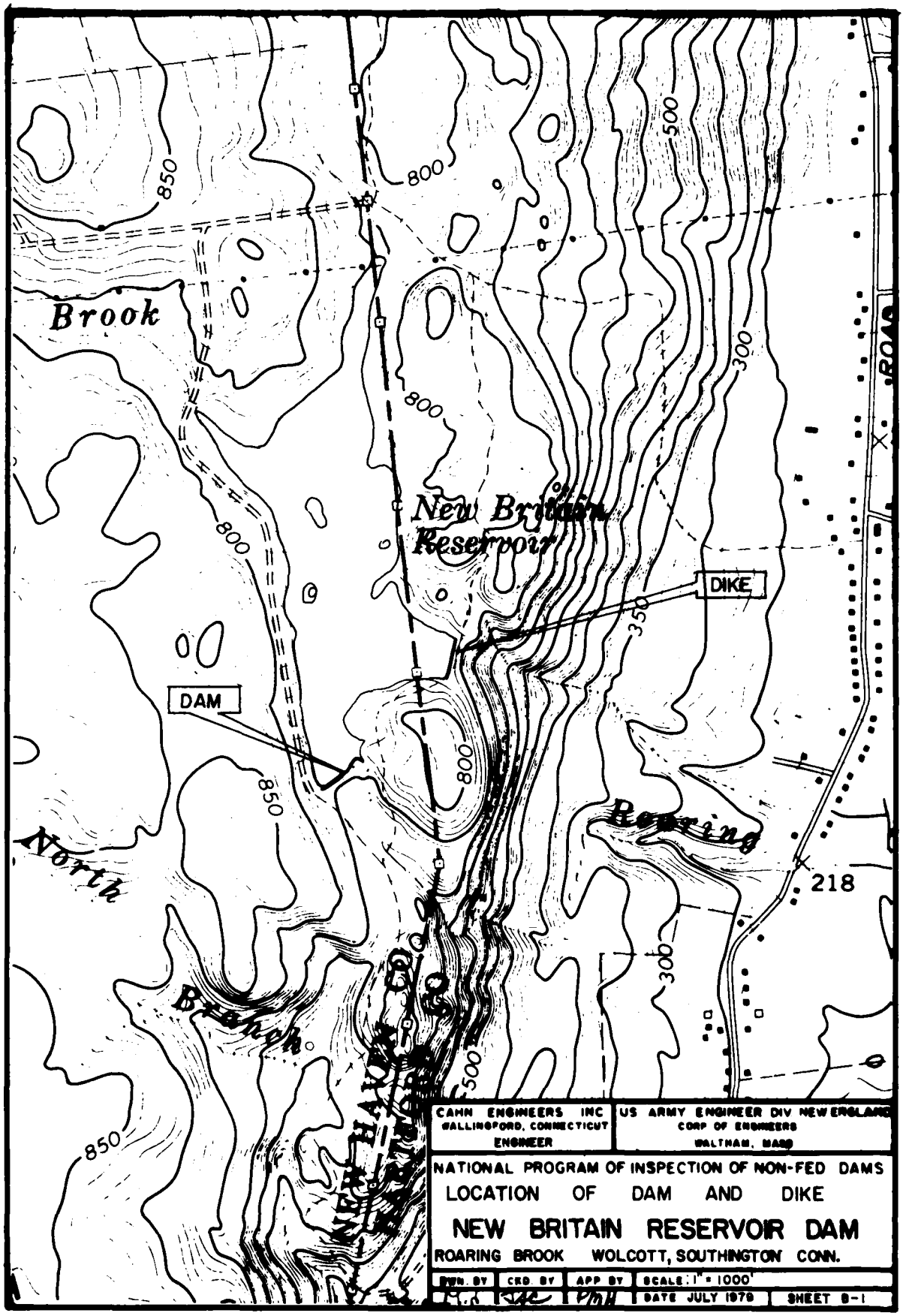
PROJECT New Britain Reservoir Dam DATE May 4 and July 16, 1979

PROJECT FEATURE Concrete Spillway BY PMH, MP, GS, JC

AREA EVALUATED		CONDITION
OUTLET WORKS-SPILLWAY WEIR, APPROACH AND DISCHARGE CHANNELS		
a) Approach Channel		
General Condition		Good
Loose Rock Overhanging Channel		None observed
Trees Overhanging Channel		
Floor of Approach Channel		Natural lake bottom
b) Weir and Training Walls		
General Condition of Concrete		poor
Rust or Staining		None observed
Spalling		Many cracks, wash-out at left training wall
Any Visible Reinforcing		None observed
Any Seepage or Efflorescence		Wet cracks and lime deposits
Drain Holes		N/A
c) Discharge Channel		
General Condition		Fair
Loose Rock Overhanging Channel		Unstable rocks at left abutment
Trees Overhanging Channel		Some
Floor of Channel		Bedrock
Other Obstructions		Boulders and small trees in spillway channel

APPENDIX B

ENGINEERING DATA AND CORRESPONDENCE



CAHN ENGINEERS INC
WALLINGFORD, CONNECTICUT
ENGINEER

US ARMY ENGINEER DIV NEW ENGLAND
CORP OF ENGINEERS
WALTHAM, MASS

NATIONAL PROGRAM OF INSPECTION OF NON-FED DAMS

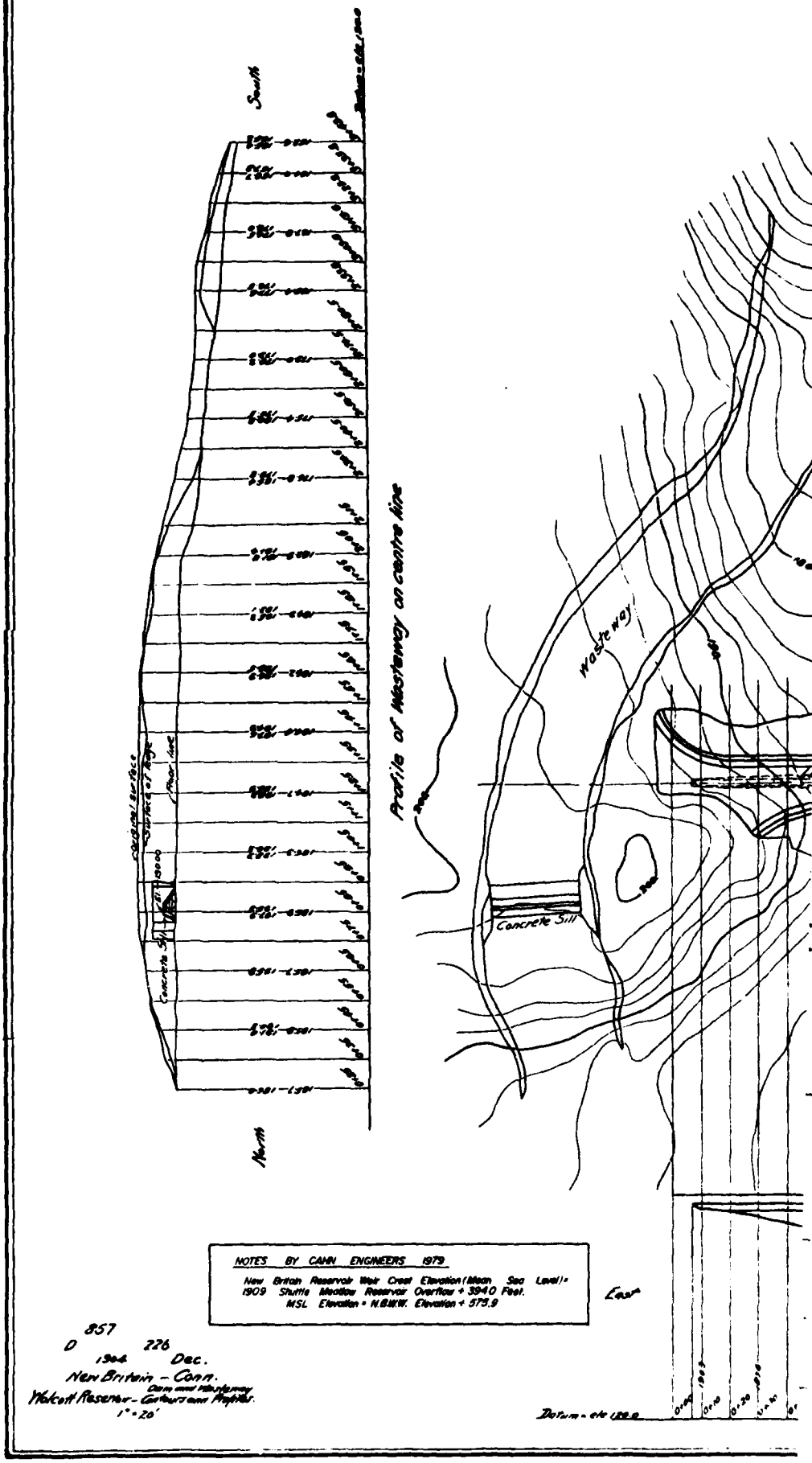
LOCATION OF DAM AND DIKE

NEW BRITAIN RESERVOIR DAM

ROARING BROOK WOLCOTT, SOUTHINGTON CONN.

DWN. BY	CKD BY	APP BY	SCALE: 1" = 1000'
			DATE JULY 1978

SHEET 8-1



NOTES BY CAHN ENGINEERS 1979

New British Reservoir Weir Crest Elevation (Mean Sea Level) = 1909 Shuttle Meadow Reservoir Overflow + 3940 Feet.
MSL Elevation = N.B.S.W. Elevation + 575.9

857
D 276
1904 Dec.
New Britain – Conn.
Dam and Waterway
Walcott Reservoir – Contours and Profiles.
1" = 20'

(1)

A

NEW BRITAIN WATER WORKS
1904

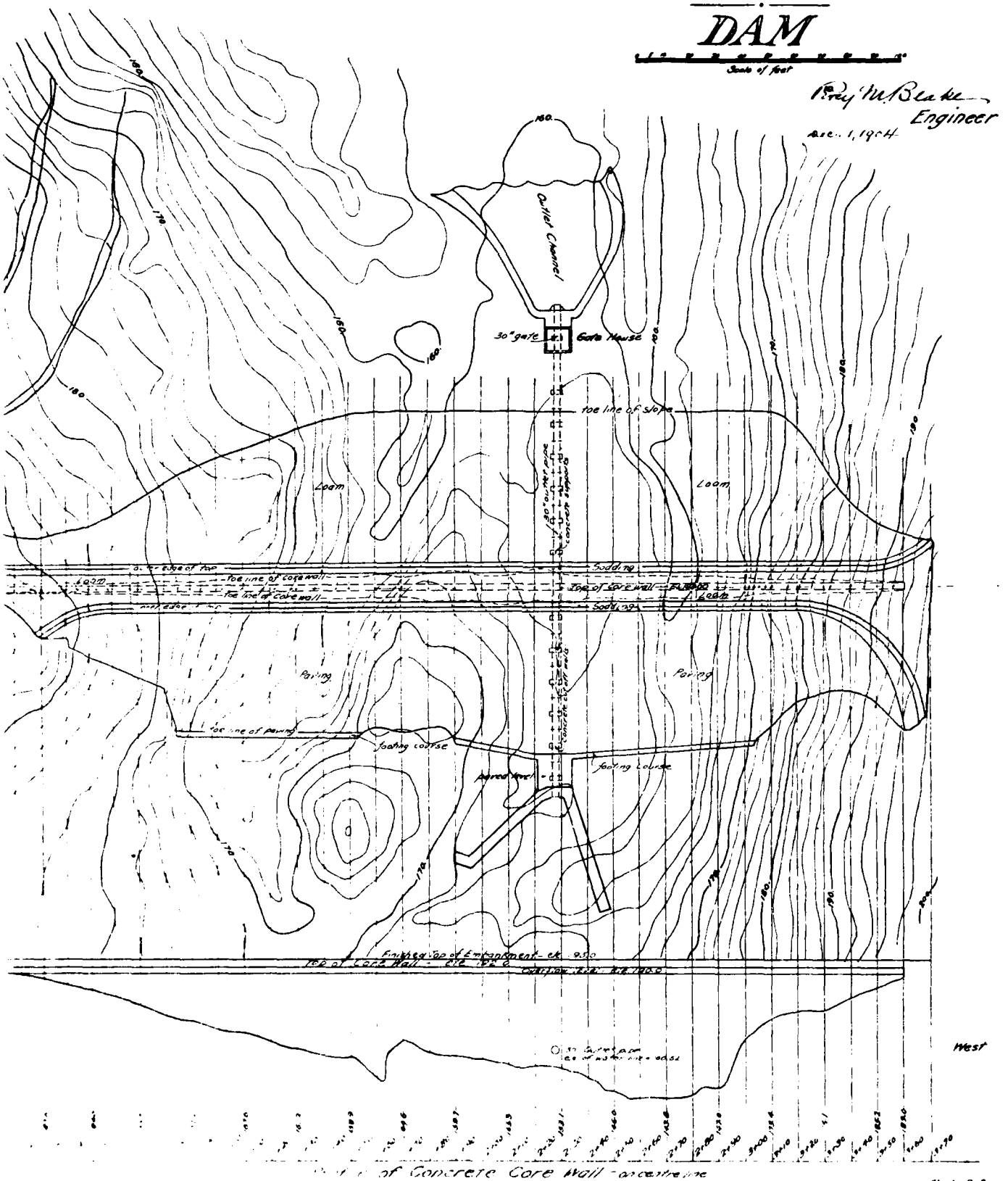
WOLCOTT RESERVOIR

DAM

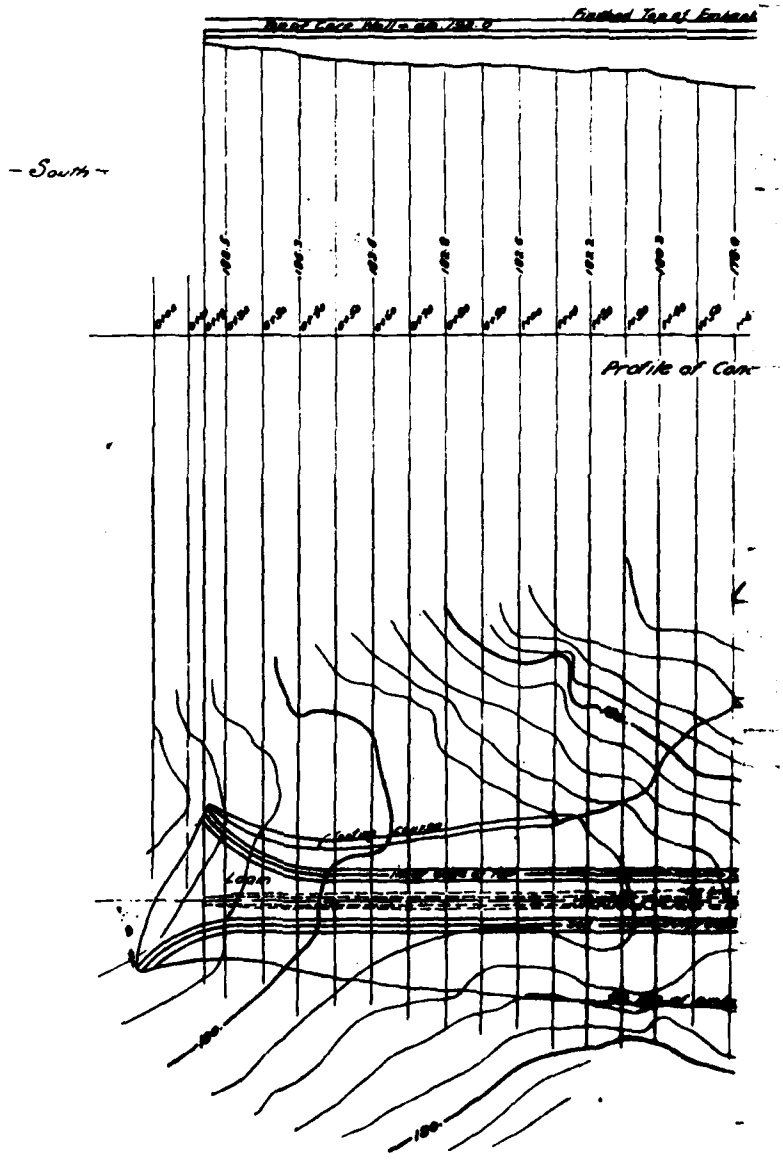
Scale of feet

Percy W. Blake
Engineer

Dec. 1, 1904



Sheet 8-2



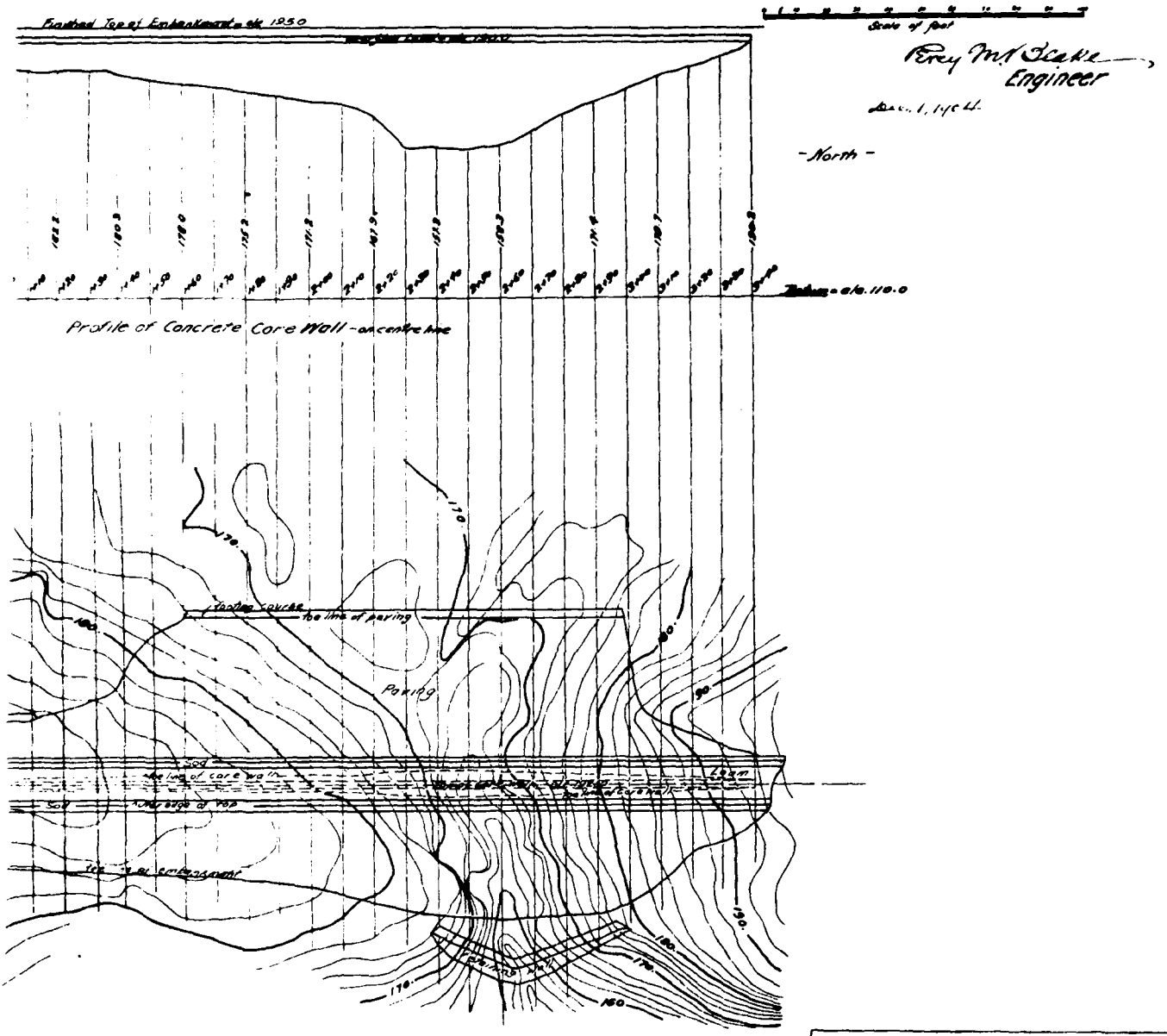
858
D 227
1904 Dec.
New Britain - Conn.
Water Supply -
Walnut Reservoir - Contours and Profile
1" = 20'

(1)

B

NEW BRITAIN WATER WORKS
1904

WOLCOTT RESERVOIR
DYKE



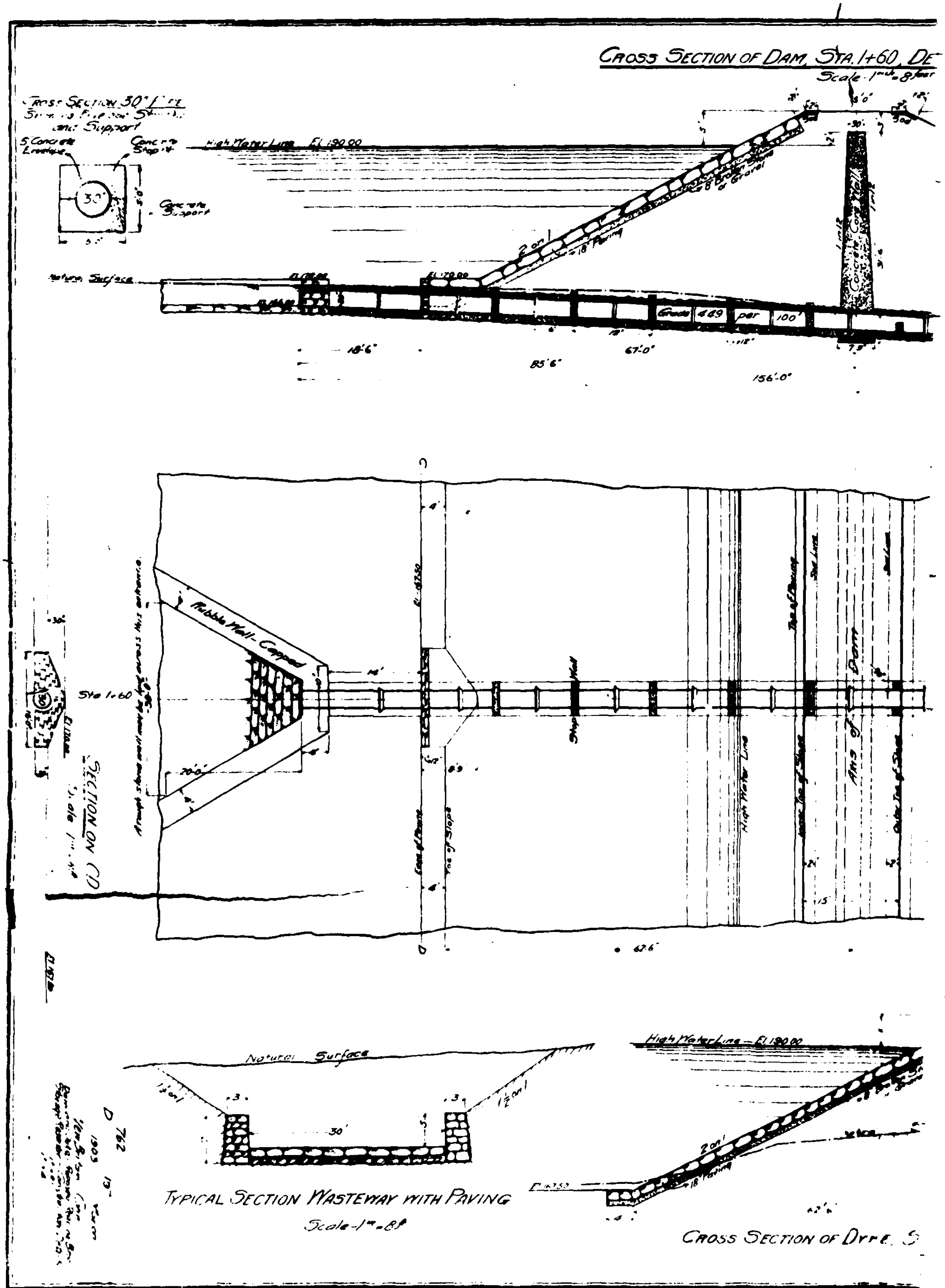
NOTES BY CAHN ENGINEERS 1979

New Britain Reservoir Was Crest Mean Sea Level +1904 Survey Meadow Reservoir Overflow + 394.0 Feet

MSL Elevation + NBWW Elevation +575.9

(2)

Sheet R-3


Cross Section of Dam, Sta. 1+60, De
Scale 1 inch = 8 feet
and Support
Concrete Envelope
Concrete Support
High Water Line El. 190.00
Natural Surface
2 on 1
18" Paving
Grade 4.69 per 100'
18'6"
85'6"
67'-0"
156'-0"
Rubble Wall - Capped
Sta 1+60
Stop Wall
High Water Line
Section on (1)
Natural Surface
30'
Typical Section Wasteway with Paving
Scale 1 in = 8 ft
High Water Line - El. 190.00
Cross Section of Dyke, S

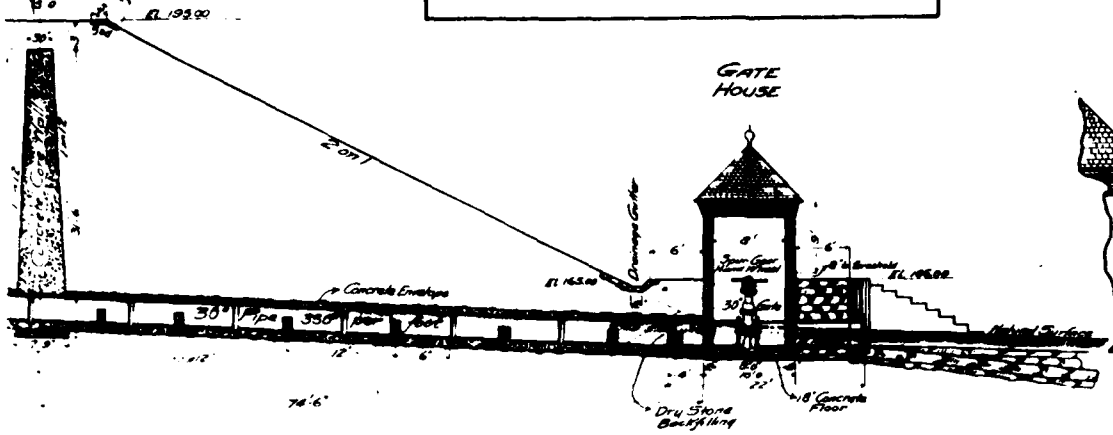
(1)

NOTES BY CAHN ENGINEERS 1979

1. MEAN SEA LEVEL = N.B.W.W. ELEVATION + 575.9
2. * NOT IDENTIFIED AT TIME OF FIELD INSPECTION.

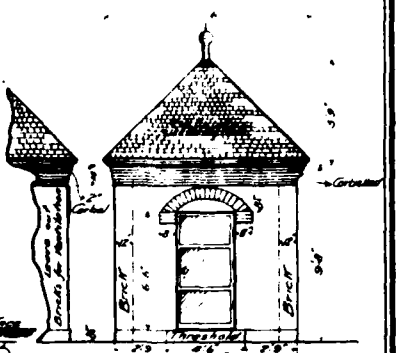
STA. 1+60 DETAILS OF CONSTRUCTION.

Scale - 1 inch = 8 feet

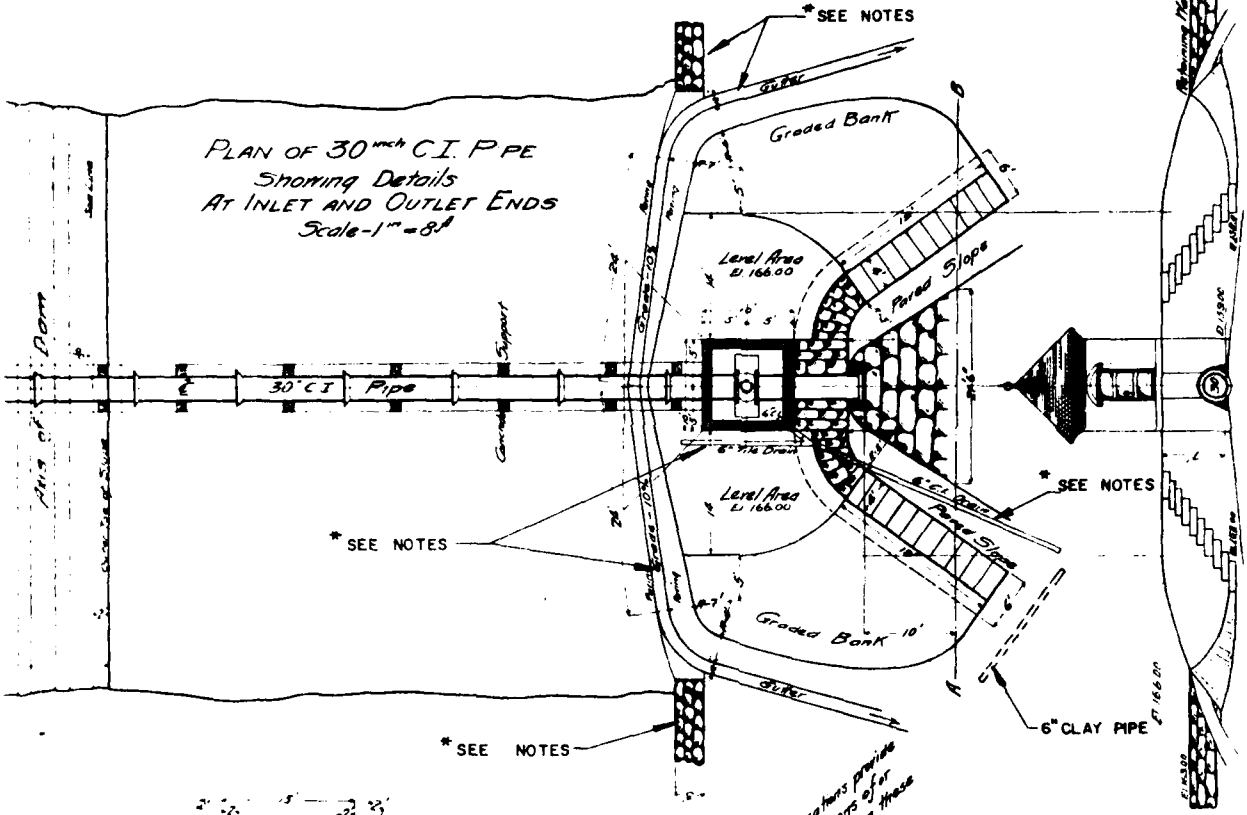


END ELEVATION

Scale 1 inch = 4 ft

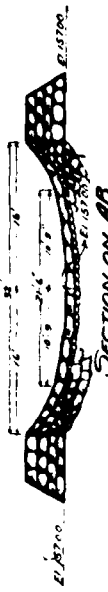


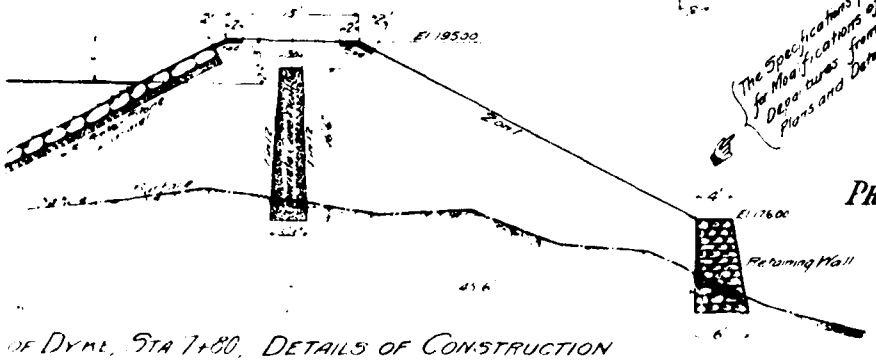
PLAN OF 30 inch C.I. PIPE
Showing Details
AT INLET AND OUTLET ENDS
Scale - 1 inch = 8 ft



ELEVATION OUTLET END
Scale - 1 inch = 8 ft

SECTION ON AB
Scale - 1 inch = 8 ft





The Specifications provide for Modifications of Design as shown from these Plans and Details.

NEW BRITAIN WATER WORKS
1903

DAM AND DYKE
PROPOSED ROARING BROOK STORAGE RESERVOIR
Construction Details

Scales — 1 inch = 8 ft
1 inch = 4 ft

OF DYKE, STA 1+80. DETAILS OF CONSTRUCTION
Scale - 1 inch = 8 ft

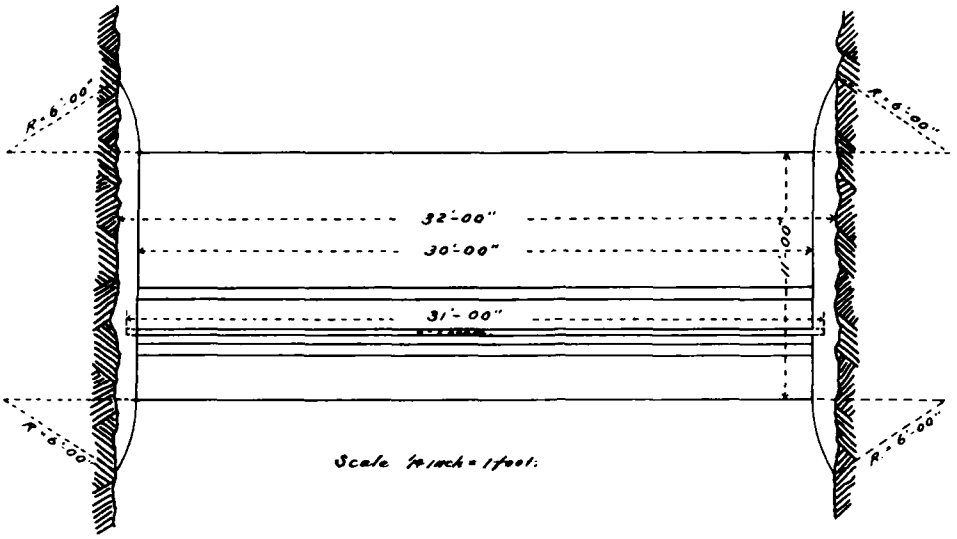
March 25-1903.

Engineer

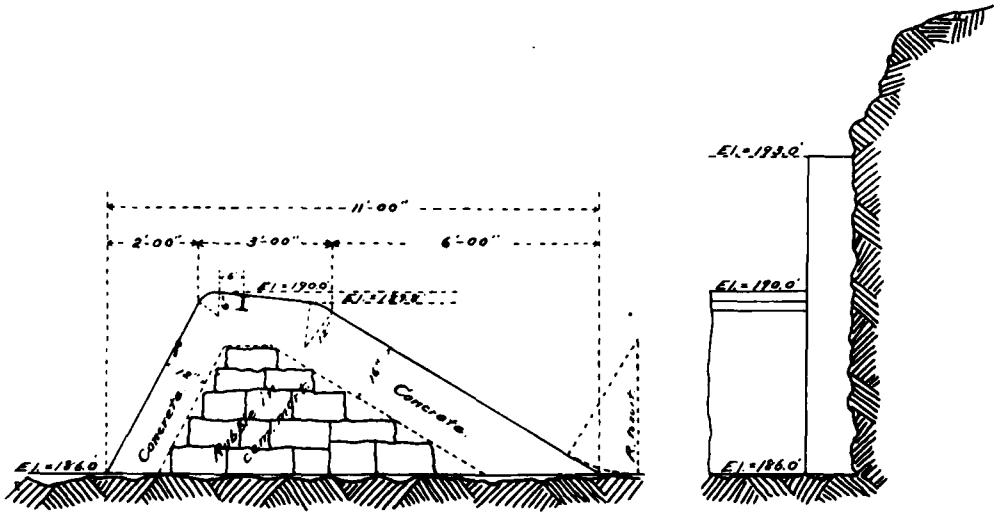
SHEET B-4

(2)

[redacted]



Scale 1/4 inch = 1 foot.



Scale 1/2 inch = 1 foot.

NOTES BY CAHN ENGINEERS 1979

1. NEW BRITAIN RESERVOIR WEIR CREST (MSL) = 1909 SHUTTLE MEADOW RESERVOIR OVERFLOW + 394.0 FEET.
   MSL ELEVATION = N.B.W.W. ELEVATION + 575.9
2. 1.9' STOP-PLANKS WERE INSTALLED IN 1977 TOP ELEVATION OF STOP-PLANKS, 767.8 (MSL)

New Britain W.W.-Wolcott Reservoir

Waste Way Crest

Roy M. Beahe
Oct. 6, 1904 Chief Engr.

SHEET B-5

NEW BRITAIN RESERVOIR DAM

EXISTING PLANS

"Proposed Roaring Brook Storage Reservoir"
New Britain Water Works (1901)
Percy M. Blake, Engineer
Hyde Park, Mass.
1 sheet

"Dam and Dyke - Construction Details"
New Britain Water Works (March 25, 1903)
Percy M. Blake, Engineer
Hyde Park, Mass.
1 sheet

"Wasteway Crest"
New Britain Water Works (Oct. 6, 1904)
Percy M. Blake, Engineer
Hyde Park, Mass.
1 sheet

"Wolcott Reservoir Dam"
New Britain Water Works (Dec. 1904)
Percy M. Blake, Engineer
Hyde Park, Mass.
Set of 8

SUMMARY OF DATA AND CORRESPONDENCE

Water can be added to Wasel Reservoir by gravity from Wolcott Reservoir. No flow from Wolcott can be obtained at Wasel when water from Patton Brook is being drawn. Water can be pumped to Wasel Reservoir from Harts Ponds, either North or South though the Hart Pond Pump Station.

A connection is under construction to allow Whigville to floww by gravity Wasel, Nepaug to be pumped to Wasel, or White Bridge Brook water to be pumped to Wasel.

HART POND: These reservoir or ponds are fed naturally by runoff from the surrounding drainage area. The drainage area is 1.8 square miles. When full the North pond contains one hundred eight-nine million (189,000,000) gallons of water and the South pond contains sixty-three million (63,000,000) gallons of water.

Water from either pond can be pumped through the Hart Pond Station to Wasel Reservoir. Water from the South pond can flow into the North pond through a pipeline and when full, overflow into the North Pond.

Overflow from the North Pond is wasted.

WOLCOTT RESERVOIR: This reservoir is fed naturally from runoff over the surrounding drainage area. The major break feeding the reservoir is called Roaring Brook. The drainage is 2.5 square miles. When full, Wolcott contains on hundred seventy million, ninety-five thousand(170,095,000) gallons of water.

Water from Wolcott can flow by gravity to either Shuttle Meadow Reservoir or Wasel Reservoir. Overflow from this source is wasted.

PATTON BROOK PUMP STATION: This source is a shallow well which can produce 1.2 million gallons of water per day. Patton Brook which recharges the ground water aquifer has a drainage area of 2.2 square miles. There is only minor surface water stroage at this point.

Patton Brook pumps water to Shuttle Meadow Reservoir through the Wolcott pipelines. When in use Wolcott cannot be used to replenish Wasel but must flow into Shuttle Meadow Reservoir also.

NEPAUG: Nepaug is a large reservoir owned and operated by the metropolitan District in Hartford. The New Britain Water Department has a connection with this supply so that water can be purchased from the Metropolitan District Commission.

Through the Nepaug Pump Station, water can be pumped into the line from Whigville Reservoir to the Filter Plant, or Shuttle Meadow Reservoir at the East or West canals.

No water from Whigville can be used at this time. Because some of this water is used for consumption onthe trip to New Britain, chlorination for disinfection is applied at Nepaug.

WATER RESOURCES COMMISSION
SUPERVISION OF DAMS
INVENTORY DATA

CT661

20

Inventoried By C

Date Aug 22, 1974

NEW BRITAIN RES

Name of Dam or Pond ~~Walcott Reservoir~~

Code No. W-20

Nearest Street Location Beecher Road

Town Walcott

LAT 41°36.5'

U.S.G.S. Quad.

LONG 72°56.1'

Name of Stream Roaring Brook

Owner New Britian Water Co.

Address New Britian Conn.

Pond Used For Water Supply

DA 2.455SM

Dimensions of Pond: Width _____ Length _____ Area 55.0

Total Length of Dam 450 feet Length of Spillway 30ft

Location of Spillway eastern end of the dam

Height of Pond Above Stream Bed ~~30-35 feet~~ 40ft?

Height of Embankment Above Spillway 10 feet

1934

Type of Spillway Construction concrete cap over rock channel

Type of Dike Construction earthen fill with stone upstream face

Downstream Conditions Water Company property- wooded

Summary of File Data Struct ht 50 hydra ht. 48

normal cap 1320 max cap 1584

Remarks This dam has a design very close to that used by Army Corps with emergency spillway through rock - drawn down at time of inspection

Would Failure Cause Damage? probably because of size Class _____

B-4

New Britain Res. Dam

Transcription of field Notes

To: File

From: J. Costello

Date: 7/16/79

Operator: Ronald Buccatri

Tel: (203) 876 - 0706

Downstream Valve station w/ small dam where water is collected from stream and into New Britain pump station where it is diverted to Wasel and Shuttle Meadow.

Readings taken daily by operator.

Downstream slope of Dam just above gatehouse is a large rut made by trespassing dirtbikes. Operator says they are on the dam a lot, and there is evidence of such. (We heard some while there)

Gatehouse - No cracking evident in chamber walls.

Dry laid brick floor w/ sand foundation

Couldn't find 6" C.I. drain pipe indicated in prelim. plans.

floor stand - hand operated - part way open

valve operated for 30" outlet twice a year

No signs of seepage or erosion on d/s slope, abutments or dike.

Could not find stone gutter or retaining wall on d/s toe of dam

6" tile pipe: don't tell where it originates

less than .5 gpm out of pipe (visual)

u/s slope of dam has vegetation very heavy at crest & some between cracks in riprap. Riprap in good condition. Dam cut about twice a year.

u/s slope of dike has lots of vegetation but riprap in good cond. the whole dikeway overgrown & needs cutting and trimming badly.

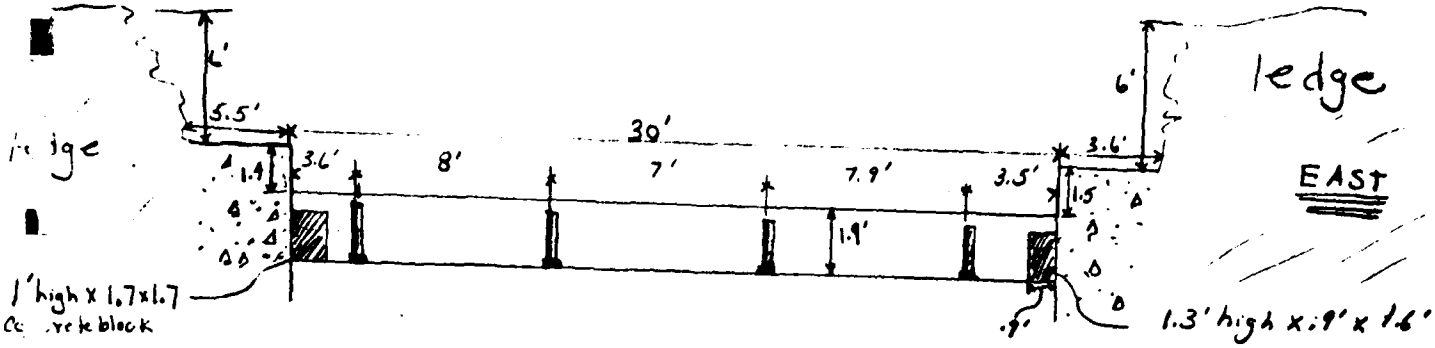
Spillway: - Cracking on downstream face & base of weir.

- boulders in downstream channel (left side mostly). They have fallen from the left channel wall & there are three more that look like they are ready to come down.
- Cracks, spalling, lime deposits on both spllwy. training wall. some large cracks w/ pieces of concrete missing. Has been patched before when stoplogs were put in (approx. 2yrs.)
- stoplogs: 1.9' high x 2" wide with a 3" board along length

- No visible seeps

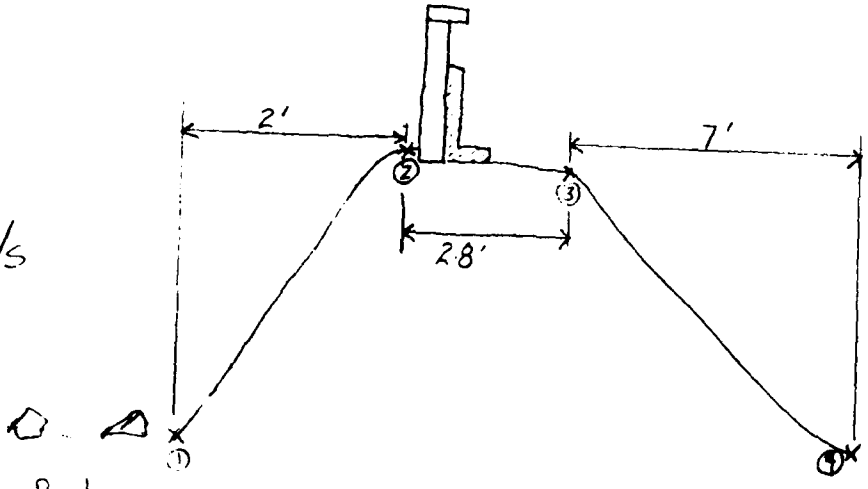
Spillway

3/5 7/10/79
J.C



elevation

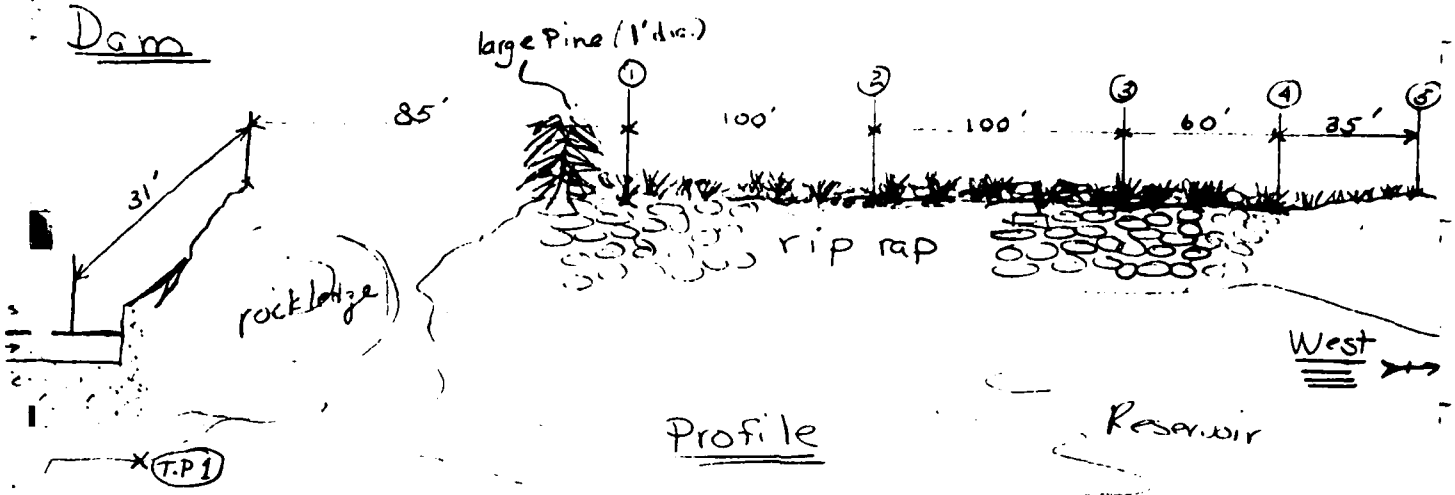
* Not to scale



Rod	Elev.
1. 7.49	186.3
2. 3.81	190.0
3. 4.31	189.5
4. 8.43	185.4

H.I = 193.81

Dam



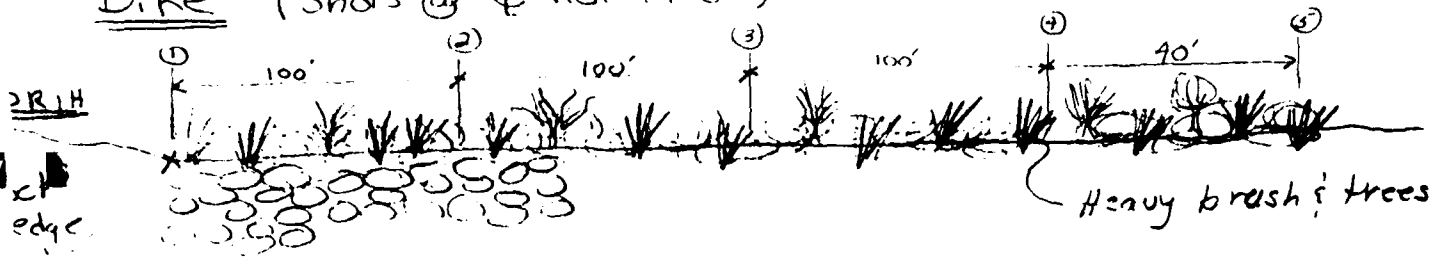
Profile

Reservoir

T.P 1

Rod	Elev.	
10.23	200.23 (H.I)	
5.76	194.5	194.5
5.66	194.6	
5.85	194.4	
6.03	194.2	
4.67	195.6	
.94	190.94 (H.I)	
6.35	184.6 (water level)	

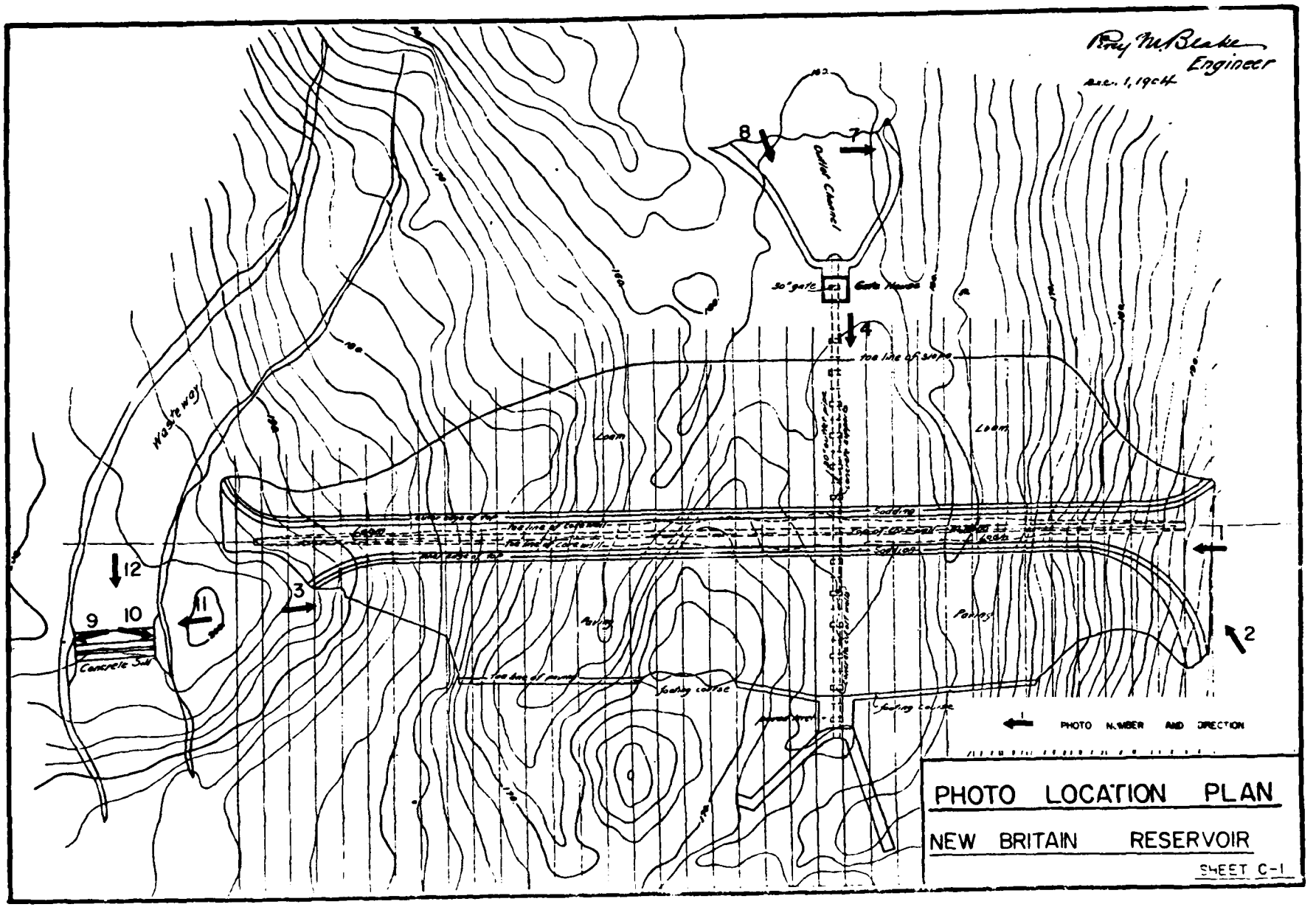
Dike (shots @ & not crest)



Pt.	rod	Elev.	
TP		184.6	
H.I.	14.83	199.4	
1	3.77	195.63	
2	4.32	195.1	195.2
3	4.26	195.2	
4	4.19	195.2	
5	4.25	195.2	

APPENDIX C

DETAIL PHOTOGRAPHS


Roy M. Blake
Engineer
Dec. 1, 1944
Outlet Channel
30" gate
Gate House
toe line of slope
Waste way
Loam
Sodding
Parking
Concrete Sill
toe line of parapet
Fishing cottage
Asphalt drive
PHOTO NUMBER AND DIRECTION
PHOTO LOCATION PLAN
NEW BRITAIN RESERVOIR
SHEET C-1

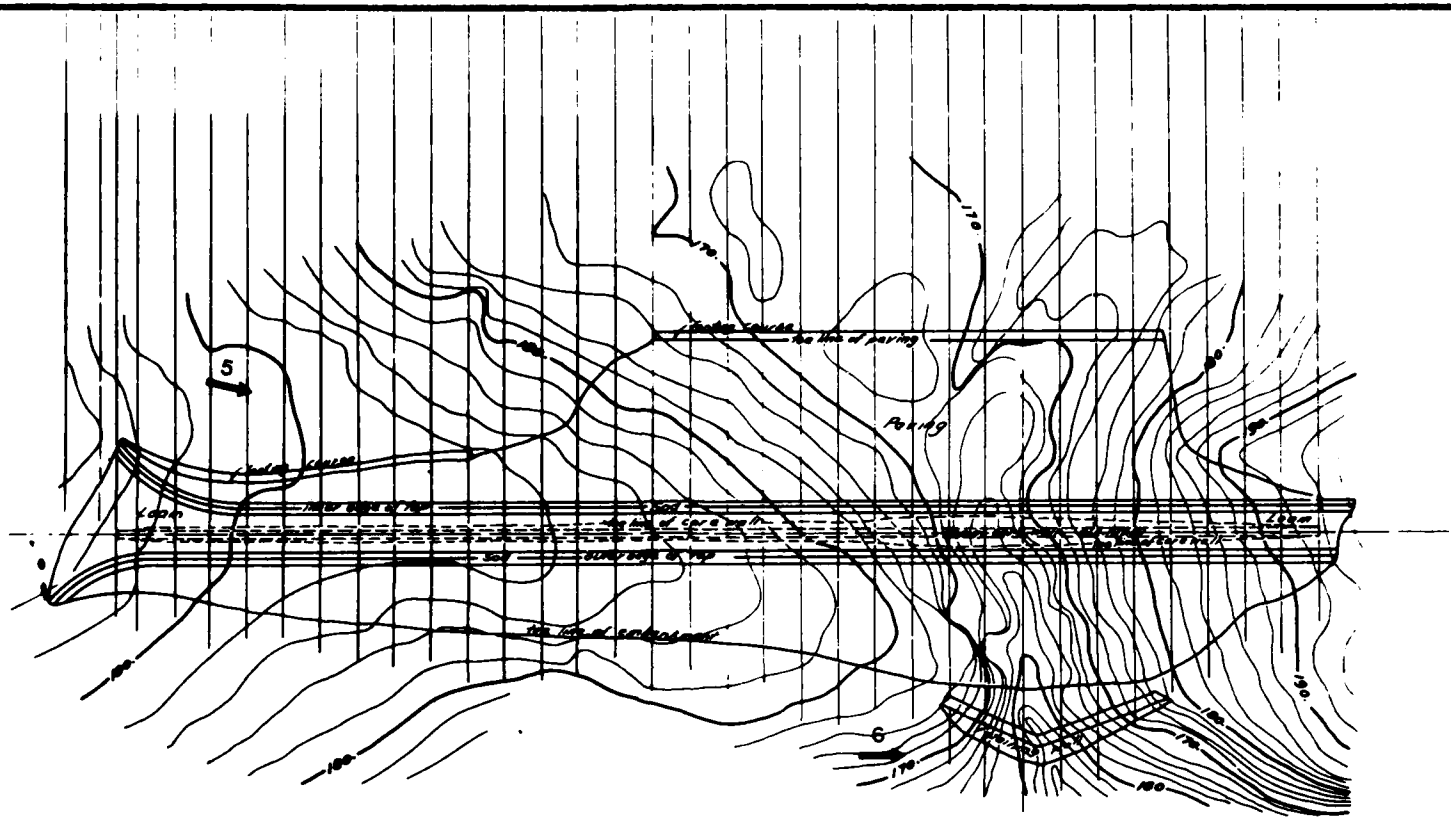


PHOTO LOCATION PLAN

NEW BRITAIN RESERVOIR DIKE

SHEET C-2

PHOTO 1 - Top of main embankment. Note damage to top of embankment by vehicles and precipitation (May, 1979).

PHOTO 2 - Erosion area on upstream right abutment of main embankment (May, 1979).

US ARMY ENGINEER DIV. NEW ENGLAND CORPS OF ENGINEERS WALTHAM, MASS.	NATIONAL PROGRAM OF	New Britain Reservoir Dam Roaring Brook Wolcott, Connecticut
CAHN ENGINEERS INC. WALLINGFORD, CONN. ENGINEER	INSPECTION OF NON-FED. DAMS	CE# 27 660 KB DATE Aug. '79 PAGE C-1

PHOTO 3 - Crest and upstream slope of main embankment. Note brush and grass on riprap (July, 1979).

PHOTO 4 - Downstream slope of main embankment above gatehouse. Note erosion, brush and trees (July, 1979).

PHOTO 5 - Crest and upstream slope of dike. Note heavy brush and small trees (July, 1979).

PHOTO 6 - Stone retaining wall on downstream slope of dike. Note open joints and damaged stones (May, 1979).

US ARMY ENGINEER DIV. NEW ENGLAND CORPS OF ENGINEERS WALTHAM, MASS.	NATIONAL PROGRAM OF	New Britain Reservoir Dam Roaring Brook Wolcott, Connecticut CE # 27 660 KB
CAHN ENGINEERS INC. WALLINGFORD, CONN. ENGINEER	INSPECTION OF NON-FED. DAMS	DATE Aug. '79 PAGE C-3

PHOTO 7 - 6" tile drain pipe outlet near headwall, right side of gatehouse. Note seepage and brown material deposits. Flow rate equal to 4-5 gal./min. (May, 1979.)

PHOTO 8 - Masonry headwall and low-level outlet. Note seepage and efflorescence along mortar joints. Also rocks and logs in outlet discharge channel.(May, 1979).

US ARMY ENGINEER DIV. NEW ENGLAND CORPS OF ENGINEERS WALTHAM, MASS	NATIONAL PROGRAM OF INSPECTION OF NON-FED. DAMS	New Britain Reservoir Dam Roaring Brook Wolcott, Connecticut CE# 27 660 KB DATE Aug. '79 PAGE C-4
CAHN ENGINEERS INC. WALLINGFORD, CONN. ENGINEER		

PHOTO 9 - Left training wall of spillway. Note cracks, lime deposits and wash-out at lower end (July, 1979)

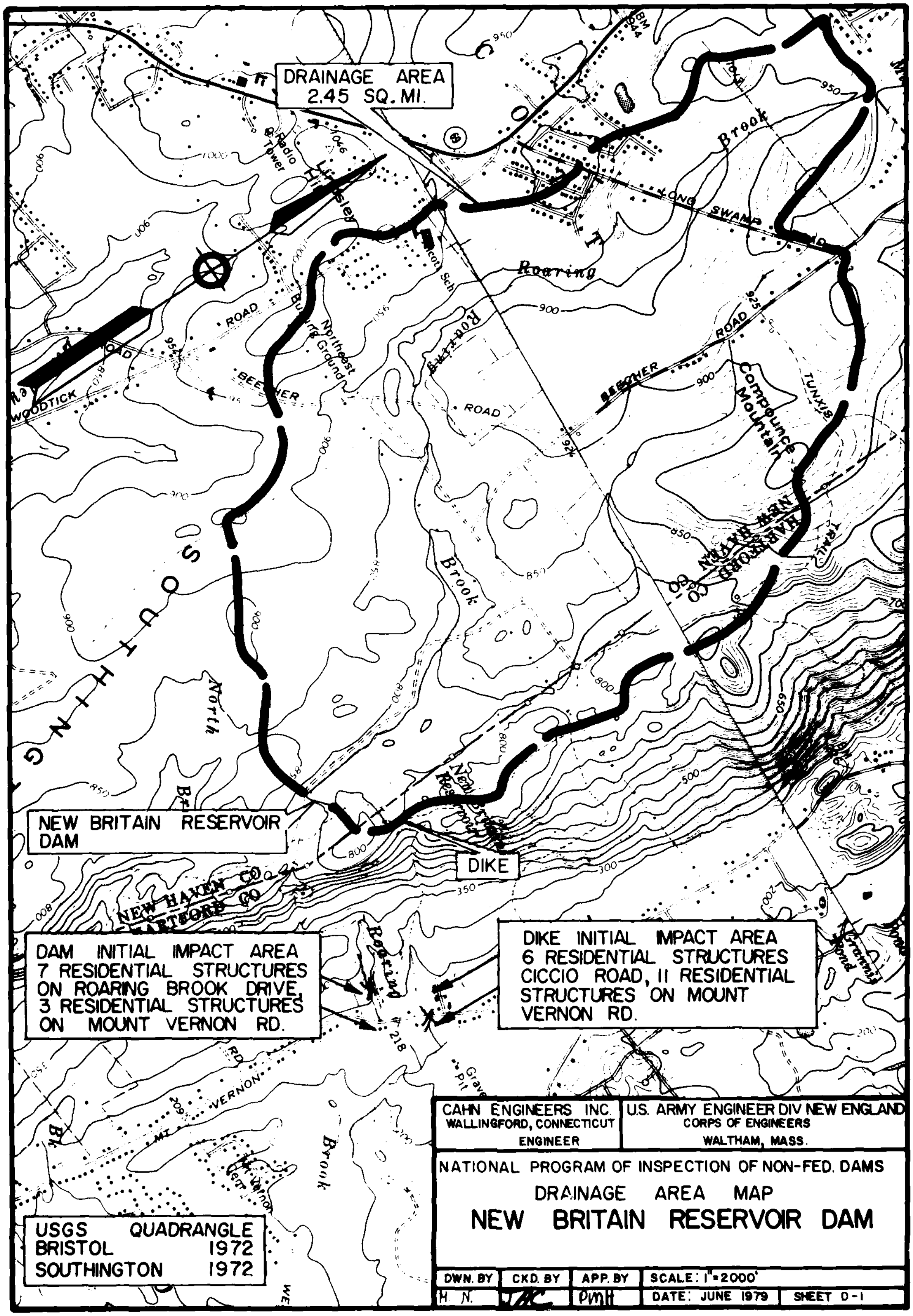
PHOTO 10 - Right training wall of spillway. Note cracks, spalling and efflorescence (July, 1979).

PHOTO 11 - Left spillway abutment. Note overhanging boulders, general erosion and boulders in channel (July, 1979).

PHOTO 12 - Spillway discharge channel and stop-planks. Note cracks in weir crest and deterioration of concrete at base of weir (July, 1979).

APPENDIX D

HYDRAULICS/HYDROLOGIC COMPUTATIONS


DRAINAGE AREA 2.45 SQ. MI.
NEW BRITAIN RESERVOIR DAM
DIKE
DAM INITIAL IMPACT AREA 7 RESIDENTIAL STRUCTURES ON ROARING BROOK DRIVE, 3 RESIDENTIAL STRUCTURES ON MOUNT VERNON RD.
DIKE INITIAL IMPACT AREA 6 RESIDENTIAL STRUCTURES CICCIO ROAD, 11 RESIDENTIAL STRUCTURES ON MOUNT VERNON RD.
USGS QUADRANGLE
BRISTOL 1972
SOUTHINGTON 1972
Roaring Brook
Compounce Mountain
LONG SWAMP ROAD
BEECHER ROAD
WOODTICK ROAD
TUNXIS TRAIL
NEW HAVEN CO
HARTFORD CO
MT VERNON RD
CAHN ENGINEERS INC.
WALLINGFORD, CONNECTICUT
ENGINEER
U.S. ARMY ENGINEER DIV NEW ENGLAND
CORPS OF ENGINEERS
WALTHAM, MASS.
NATIONAL PROGRAM OF INSPECTION OF NON-FED. DAMS
DRAINAGE AREA MAP
NEW BRITAIN RESERVOIR DAM
DWN. BY H N.
CKD. BY
APP. BY
SCALE: 1"=2000'
DATE: JUNE 1979
SHEET D-1

HYDRAULIC/HYDROLOGIC INSPECTION

NEW BRITAIN RESERVOIR DAM, WOLCOTT, CONN.

I. PERFORMANCE AT TEST FLOOD CONDITIONS

1) MAXIMUM PROBABLE FLOOD

a) WATERSHED CLASSIFIED AS ROLLING

b) WATERSHED AREA : DA = * 2.50 Sq. Mi

NOTE: D.A. FROM NEW BRITAIN WATER CO. D.A. = 2.5 Sq. Mi; USGS HARTFORD OFFICE D.A. = 2.45 Sq. Mi; CE FROM USGS BRISTOL & SOUTHINGTON, CT, QUADRANGLES, 1:24000, D.A = 2.45 Sq. Mi.

c) FROM NED-ACE "PRELIMINARY GUIDANCE FOR ESTIMATING MAX. PROBABLE DISCHARGES" - GUIDE CURVE FOR PMF - PEAK FLOW RATES

PMF ≈ 2100 CFS/Sq. Mi.

d) PEAK INFLOW PMF ≈ 2100 × 2.5 ≈ 5300 CFS

2) SPILLWAY DESIGN FLOOD (SDF)

a) CLASSIFICATION OF DAMS ACCORDING TO NED-ACE RECOMMENDED GUIDELINES

c) SIZE * STORAGE (MAX) 700 Ac-ft 50 ≤ S 1000 Ac-ft
HEIGHT ≈ 37'(DAM) (25 < H < 40 ft)
39'(DIKE)

HEIGHT MEASURED BY CE. FROM ELEV. IN AVAILABLE DRAWINGS BY RAY BLAKE, ENGR, "WOLCOTT RESERVOIR - CROSS SECTION OF DAM," STA 2+60, 1904; U.S. INVENTORY OF DAMS (1974) - 50'

NEW BRITAIN RESERVOIR DAM

2a CONT'D CLASSIFICATION

STORAGE THE U.S. INVENTORY OF DAMS INDICATES CAPACITY AT FLOW LINE (EL.(±)768'MSL) AS 1320 Ac.FT. THE NEW BRITAIN WATER COMPANY GIVES THE CAPACITY AT FLOW LINE AS 170,000,000 GALLONS OR 520Ac. FT.

C.E. WILL USE 520 Ac. FT. AS STORAGE VOLUME AT FLOW LINE AND CALCULATE MAXIMUM CAPACITY AT TOP OF DAM. (STORAGE BETWEEN FLOW LINE AND TOP OF DAM ≈ 170Ac.FT. ∴ (MAX. STORAGE ≈ 700 Ac.FT.)

ii) HAZARD POTENTIAL

THE DAM IS LOCATED (±) 4500' U/S FROM A GROUP OF HOMES ALONG ROARING BROOK NEAR MT. VERNON ROAD, SOUTHINGTON, CT. NEW BRITAIN RESERVOIR ALSO HAS A DIKE ON THE S.E SHORE. THIS DIKE IS LOCATED (±) 3000' U/S FROM A GROUP OF HOMES NEAR MT. VERNON ROAD, AT A BROOK ORIGINATING NEAR THE DIKE. THE HOMES ARE NO HORE THAN (±) 10' ABOVE THE BED OF EITHER BROOK.

NEW BRITAIN RESERVOIR DAM

2a CON'D) CLASSIFICATION

iii SIZE : SMALL

HAZARD: HIGH

b) SDF = PMF TO ½ PMF

3) SURCHARGE AT PEAK INFLOWS

a) PEAK INFLOW PMF ≈ 5300 CFS

b) SPILLWAY (OUTFLOW) RATING CURVE

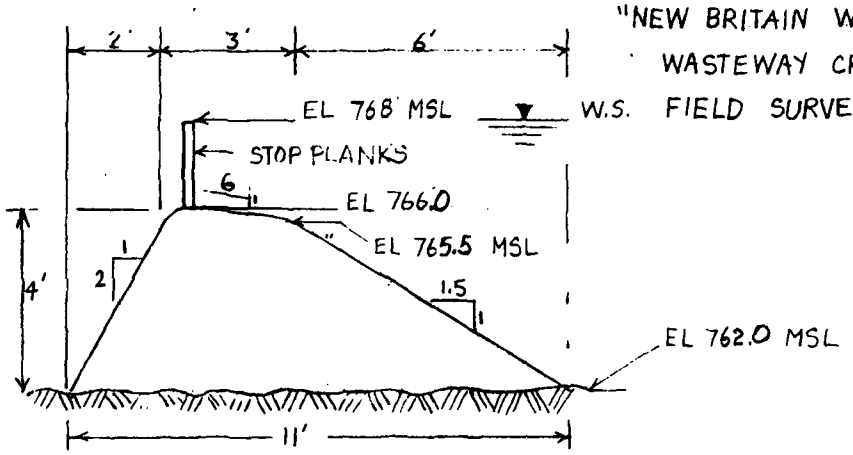
i) SPILLWAY

THE SPILLWAY IS A COMPOUND WEIR OF TRAPEZOIDAL CROSSECTION.
THE TOP OF THE CONCRETE AND RUBBLE WEIR HAS STOP-PLANKS 1.9' HIGH x 2" WIDE TOPPED BY A 3" BOARD. THE CREST OF THE WEIR PLUS STOP PLANKS IS (±) 768' MSL, IN PLAN THE LENGTH OF THE SPILLWAY CREST IS L = 30', AND THE DISTANCE FROM THE TOP OF THE STOP-PLANKS TO THE TOP OF THE DAM (±) EL. 770.4 IS 2.6'.
THE WEIR IS LOCATED IN A ROCK CHANNEL, AND THE SIDES OF THE CHANNEL RISE VERTICALLY TO EL. (±) 775 AT THE WEIR. (SEE SKETCH p. 6)

NEW BRITAIN RESERVOIR

3b- CONT'D) OUTFLOW RATING CURVE

DATA FROM RAY BLAKE, PE, DWG "NEW BRITAIN WW - WOLCOTT RESERVOIR - WASTEWAY CREST" 1904; AND C.E W.S. FIELD SURVEY (07/79)



∴ SPILLWAY DISCHARGE COEFFICIENT, ASSUME C = 3.3

USING THE TOP OF STOP-PLANKS AS DATUM (ELEV 768' MSL) THE SPILLWAY DISCHARGE IS APPROXIMATED BY

$$Q_s = 3.99 H^{3/2} + 33 (H-1.5)^{3/2}$$

ii) EXTENSION OF RATING CURVE FOR SURCHARGE HEADS ABOVE TOP OF DAM

THE DAM IS AN EARTH FILL DAM OF 15' TOP WIDTH, WITH THE U/S FACE ON A 2^H TO 1^V SLOPE AND THE D/S FACE ON A 2^H TO 1^V SLOPE. THE EMBANKMENT LENGTH, EXCLUDING THE SPILLWAY IS (±) 374' HORIZ. (TOP @ ELEV. 770.4 MSL.) THERE IS A 30" DIAMETER CAST IRON PIPE, L = 178', WHICH IS GATED ON THE D/S SIDE OF THE DAM. THE U/S INVERT IS AT EL 742 MSL AND THE D/S INVERT IS AT ELEV 735' MSL.

NEW BRITAIN RESERVOIR DAM

3b-4 CONT'D) OUTFLOW RATING CURVE

THERE IS AN EARTH FILL DIKE LOCATED (±) 800' NE OF THE DAM ON THE S.E. SHORE OF NEW BRITAIN RESERVOIR. THE TOP OF THE DIKE IS 15' WIDE AND (±)346' LONG. (TOP ELEV AT 771' MSL). THE U/S SLOPE IS 2^H TO 1^V AND THE D/S SLOPE IS 2^H TO 1^V.

ASSUME C = 3.0 FOR EARTH EMBANKMENT (DIKE & DAM)
C = 2.0 FOR OVERFLOW AT SIDES OF DIKE & DAM
C = 2.7 FOR ROCK LEDGE (LEFT SIDE OF DAM)

ASSUME EQUIVALENT LENGHTS FOR THE SIDES OF DAM AND DIKE AS FOLLOWS

a) DAM

$L_R = 2/3\,(5/1)(H-2.4)^{5/2}$ $\quad Q_R = (2)(10/3)(H-2.4)^{5/2} = 6.7\,(H-2.4)^{5/2}$

$L_L = 2/3\,(9/1)(H-2.4)^{5/2} + (2/3)(11/1)(H-8)^{5/2}$ FOR $0 < H \leq 8$

$\therefore Q_L = (2.7)(6)(H-2.4)^{5/2} + (2.0)(7.33)(H-8)^{5/2}$

$L'_L = 45\,(H-h_o)^{3/2} + 2/3\,(11/1)(H-8)^{5/2}$ FOR $H \geq 8'$

$\therefore Q'_L = 121.5\,(H-h_o)^{3/2} + 14.6\,(H-8)^{5/2}$

HOWEVER, $Q_L = Q'_L$ WHEN $H = 8'$, $\therefore 121.5\,(8-h_o)^{3/2} = 1200$ cfs.

$(8-h_o) = (1200/121.5)^{2/3} = 4.6$ $\therefore h_o = 8-3.76 = 3.40$

$\therefore Q'_L = 121.5\,(H-3.40)^{3/2} + 14.6\,(H-8)^{5/2}$

NEW BRITAIN RESERVOIR DAM

35-(2-CONT'D) OUTFLOW RATING CURVE

b) DIKE

$(L_R) = (2/3)(7/1)(H-3)^{5/2}$ $\therefore (Q'_R) = 2.0(4.6)(H-3)^{5/2} = 9.3(H-3)^{5/2}$

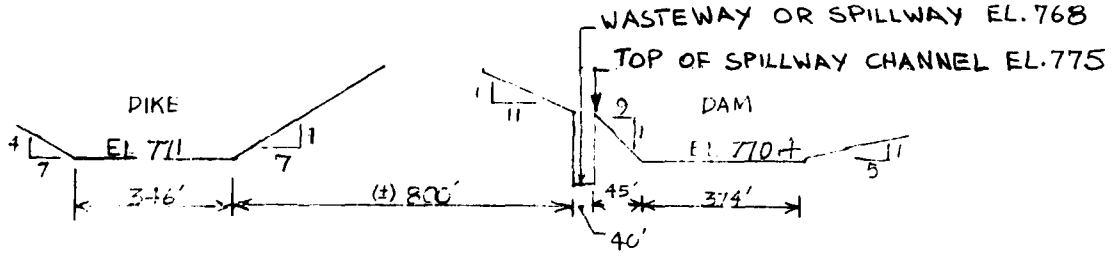
$(L_L) = (2/3)(7/4)(H-3)^{5/2}$ $\therefore (Q_L) = 2.0(1.2)(H-3)^{5/2} = 2.4(H-3)^{5/2}$

THE TOTAL OVERFLOW RATING CURVE CAN BE APPROXIMATED BY

$Q = Q_S + 1122(H-2.4)^{3/2} + 1038(H-3)^{3/2} + Q_R + [Q_L \text{ OR } Q'_L]$

$+ (Q_R) + (Q_L)$

THE OUTFLOW CURVE IS PLOTTED ON THE NEXT PAGE



c) SPILLWAY CAPACITY TO TOP OF DAM

$H = 2.4'$ $Q_S \approx 370 + 30 \approx 400$ CFS

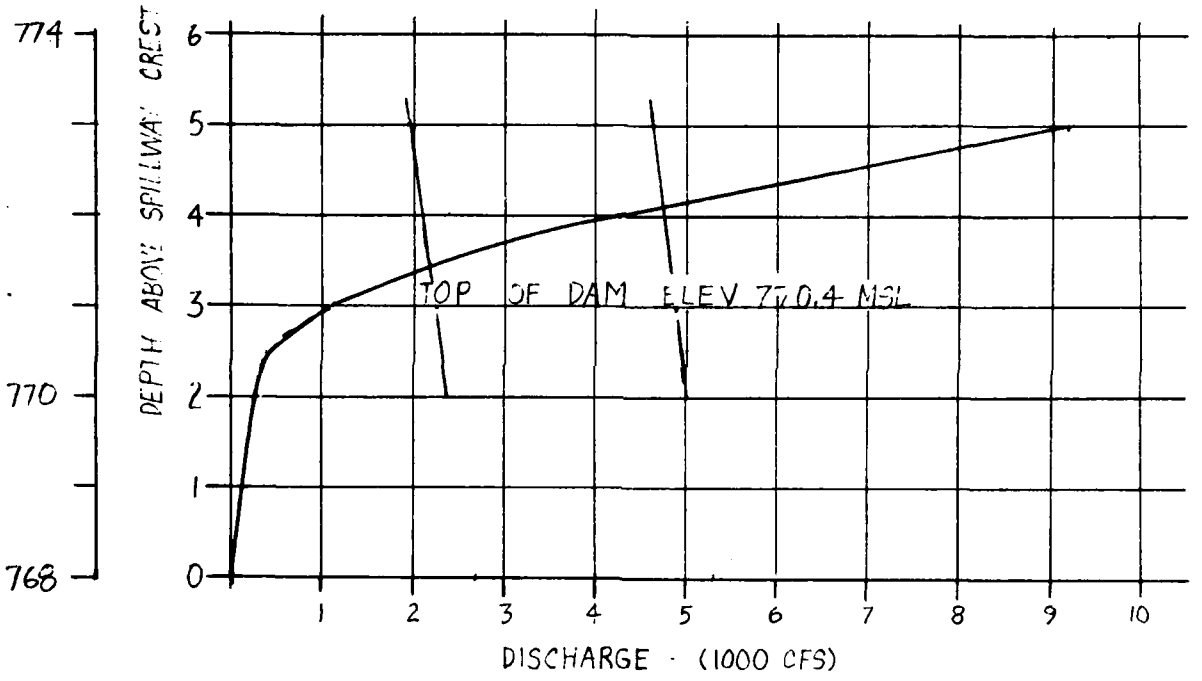
D) SURCHARGE TO PASS Q_{P_L}

i) @ Q_{P_L} = PMF ≈ 4.1'

ii) @ Q'_{P_L} = 1/2 PMF = 3.4'

NEW BRITAIN RESERVOIR DAM

3- CONT'D) OUTFLOW RATING CURVE



NOTE : THERE IS A 30" GATED CAST IRON PIPE, INV. ELEV (±) 742 @ BASE OF DAM, AND IS (±) 178' LONG (HORIZ). THIS IS USUALLY CLOSED, BUT MAY BE OPENED DURING HIGH FLOWS. BASED ON ±H = 30' @ PMF, THE OUTFLOW REPRESENTS LESS THAN 3% OF TOTAL OUTFLOW AND THEREFORE IT IS NEGLECTED FOR THE COMPUTATIONS.

NEW BRITAIN RESERVOIR DAM

4) EFFECT OF SURCHARGE STORAGE ON MAXIMUM PROBABLE DISCHARGES (OUTFLOW)

a) RESERVOIR AREA @ FLOW LINE : A_o^* = 55 Ac
ASSUMED AVERAGE AREA WITHIN EXPECTED SURCHARGE A=64 Ac.
b) ASSUME NORMAL POOL LEVEL @ STOP LOG CREST (ELEV 768' MSL)

c) WATERSHED AREA 2.45 SQ. MI. (SEE PG. 1)

d) DISCHARGE (Q_{P_2}) AT VARIOUS SURCHARGE ELEVATIONS

H = 3' V = 64 × 3 = 192 Ac·FT ∴ S = (192)/[(2.45)× 53.3] = 1.47"

H= 5' V = 64 × 5 = 320 Ac·FT ∴ S = (320)/[(2.45)× 53.3] = 2.45"

∴ FROM APPROXIMATE STORAGE ROUTING NED-ACE GUIDELINES, (19" MAX PROBABLE R.O. IN NEW ENGLAND)

$Q_{P_2} = Q_{P_1}(1 - S/19)$ AND FOR 1/2 PMF $Q'_{P_2} = Q'_{P_1}(1 - S/9.5)$

∴ FOR

H = 3' $Q_{P_2} \approx$ 4890 CFS $Q'_{P_2} \approx$ 2240 CFS

H = 5' $Q_{P_2} \approx$ 4620 CFS $Q'_{P_2} \approx$ 1970 CFS

* NOTE : FROM CONN DEP - WATER & RELATED RESOURCES - INVENTORY SHEET (1974) ; C.E. MEASURE (USGS 1:24000) A ≈ 46 Ac (EL 765), A = 88 Ac (EL 780' MSL) ; RAY BLAKE, ENGR, "NBWW (1901) PROPOSED ROARING BROOK STORAGE RESERVOIR" A ≈ 75 Ac (EL 200 NBWW ≈ EL 776 MSL ; BY INTERPOLATION, USE A = 64 Ac AS AVG LAKE AREA WITHIN EXPECTED SURCHARGE.

NEW BRITAIN RESERVOIR DAM

4-CONT'D) EFFECT OF SURCHARGE STORAGE ON PEAK OUTFLOW

e) PEAK OUTFLOW (Q_{P_3})

USING NED-ACE GUIDELINES "SURCHARGE STORAGE ROUTING" ALTERNATE METHOD

$Q_{P_3} \approx 4800$ CFS $H \approx 4.1'$ FOR Q_{P_1} = PMF

$Q_{P_3}' \approx 2150$ CFS $H \approx 3.4'$ FOR Q_{P_2} = 1/2 PMF

f) SPILLWAY CAPACITY RATIO TO OUTFLOW

SPILLWAY CAPACITY TO TOP OF DAM $Q_S \approx 400$ CFS

∴ SPILLWAY CAPACITY* IS (±) 8% OF THE OUTFLOW @ PMF AND (±) 18% OF THE OUTFLOW @ 1/2 PMF

*NOTE: THE OUTFLOW OVER THE DIKE @ PMF CONTRIBUTES (±) 1700 CFS TO THE TOTAL Q_{P_3} OF (±) 4800 CFS.
∴ THE OUTFLOW AT THE DAM SITE TO ROARING BROOK IS (±) 3100 CFS AND THE SPILLWAY CAPACITY WILL REPRESENT 12% OF THE OUTFLOW TO ROARING BROOK.

NEW BRITAIN RESERVOIR DAM

5) SUMMARY

a) PEAK INFLOW : Q_{P_1} = PMF ≈ 5300 CFS Q'_{P_1} = 1/2 PMF ≈ 2650 CFS

b) PEAK OUTFLOW Q_{P_3} = 4800 CFS Q'_{P_3} ≈ 2150 CFS

c) SPILLWAY MAX. CAPACITY : Q_S ≈ 400 CFS OR (±) 8% Q_{P_3} OR (±) 18% Q'_{P_3}

THEREFORE, AT TEST FLOOD (SDF = PMF), THE DAM IS OVERTOPPED: (±) 1.7' AND DIKE IS OVERTOPPED 1.0' (W.S.EL. 772.1) OR, TO AN AVERAGE SURCHARGE ABOVE STOPPLANKS OF (±) 4.1

AT TEST FLOOD (SDF = ½ PMF), THE DAM IS OVERTOPPED (±) 1.0 (WS EL. 771.4') AND THE DIKE IS OVERTOPPED (±) 0.4' WITH AN AVERAGE SURCHARGE ABOVE THE STOP-PLANKS OF (±) 3.4'

NEW BRITAIN RESERVOIR DAM

II) DOWN STREAM FAILURE HAZARD

1) PEAK STAGE AND FLOOD IMMEDIATELY D/S FROM DAM

a) BREACH WIDTH

i) MID-HEIGHT (±) ELEV 752 (770.4-37/2 = 751.9, SAY 752 MSL)

ii) APPROXIMATE MID-HEIGHT LENGTH $\ell \approx 243$ (CE FROM RAY BLAKE DRAWING, 1901)

iii) BREACH WIDTH (SEE NED-ACE D/S DAM FAILURE GUIDELINES)*

$W = 0.40 \times 243 = 97.2$ ASSUME $W_b = 95'$

b) PEAK FAILURE OUTFLOW (Q_P)

ASSUME SURCHARGE TO TOP OF DAM; THEREFORE

i) HEIGHT AT TIME OF FAILURE: $Y_o = 37'$

ii) SPILLWAY DISCHARGE $Q_s \approx 400$ CFS

iii) BREACH OUTFLOW (Q_b)

$Q_b = (8/27) W_b \sqrt{g}\, Y_o^{3/2} \approx 35900$ CFS

*NOTE - FROM RAY BLAKE, ENGR. DRWG. "WOLCOTT RESERVOIR - CROSS SECTION OF DAM" LOWEST ELEV D/S TOE OF DAM = 158 (NBWW)
TOP OF DAM EL 195' (NBWW) NBWW + 576 = MSL

NEW BRITAIN RESERVOIR DAM

16 - CONT) PEAK FLOOD AND STAGE IMMEDIATELY D/S FROM DAM

iv) PEAK FAILURE OUTFLOW (Q_{P_1}) $Q_{P_1} \approx Q_s + Q_b \approx 400 + 35900 \approx 36300$ CFS

c) FLOOD STAGE HEIGHT IMMEDIATELY D/S OF DAM

$Y \approx 0.44\ Y_o \approx 16'$

D) APPROXIMATE STAGE JUST BEFORE FAILURE

i) $Q = Q_s \approx 400$ CFS

THE CHANNEL JUST D/S FROM THE DAM IS ON A SLOPE OF (±) 0.12 DROPPING (±) 550^V IN (±) 4500^H. THE TERRAIN SLOPES APPROXIMATELY 2^H TO 1^V ON BOTH SIDES OF ROARING BROOK. ($n \approx 0.050$)

ii) STAGE FOR Q_s $Y \approx 3.7$ FOR $Q_s \approx 400$ CFS

e) RAISE IN STAGE AFTER DAM FAILURE

FOR A PEAK FAILURE OUTFLOW OF $Q_P \approx 36300$ CFS, $Y_P = 20.2$

$\therefore \Delta Y \approx 16.5'$ (AT IMMEDIATE IMPACT AREA)

NEW BRITAIN RESERVOIR DAM

2) PEAK STAGE AND FLOOD IMMEDIATELY D/S FROM DIKE

a) BREACH WIDTH

i) MID-HEIGHT (±) ELEV 752* (771 − 39/2 = 751.5', SAY 752' MSL)

ii) APPROXIMATE MID-HEIGHT LENGTH $\ell' \sim 51'$ (SCE FROM RAY BLAKE, ENGR, DWG 1904)

iii) BREACH WIDTH (SEE NED-ACE DAM FAILURE GUIDELINES)

$W_b = 0.40 \times 51' = 20.4'$ ASSUME $W_b' = 20'$

b) PEAK FAILURE OUTFLOW (Q_p')

ASSUME DISCHARGE TO TOP OF DIKE; THEREFORE

i) HEIGHT AT TIME OF FAILURE = $Y_o' = 39'$

ii) BREACH OUTFLOW (Q_b')

$$Q_b' = (8/27) W_b \sqrt{g}\, Y_o^{3/2} \approx 8200 \text{ CFS}$$

* NOTE: FROM RAY BLAKE, ENGR. DWGS "NBWW 1904 WOLCOTT RESERVOIR DIKE AND "NBWW-1904- WOLCOTT RESERVOIR CROSS SECTIONS OF DIKE STA 2+40 - STA 2+80. LOWEST ELEV D/S TOE OF DIKE (STONE RETAINING WALL) = 156 (NBWW) TOP OF DIKE = = 195 (NBWW)

(NBWW + 576 = HSL)

NEW BRITAIN RESERVOIR DAM

2b- CONT'D) PEAK FLOOD AND STAGE IMMEDIATELY D/S FROM DIKE

iv) PEAK FAILURE OUTFLOW $Q'_{P_1} = Q'_b \approx 8200$ CFS

c) FLOOD STAGE HEIGHT IMMEDIATELY D/S FROM DIKE

$Y' = 0.44\, Y'_o = 17'$

THE CHANNEL JUST D/S FROM THE DIKE IS ON A SLOPE OF (±) 0.19, DROPPING (±) 530^V IN (±) 2800^H. THE TERRAIN SLOPES APPROXIMATELY 4^H TO 1^V ON THE RIGHT AND 7^H TO 1^V ON THE LEFT

d) RAISE IN STAGE AFTER DIKE FAILURE

FOR A PEAK FAILURE OUTFLOW OF $Q'_P = 8200$ CFS, $Y'_P \approx 7.1$

CONSIDERING THAT THE ONLY FLOW INTO CHANNEL UP TO THE DIKE FAILURE WILL BE LOCALIZED RUNOFF, THE RAISE IN STAGE WILL BE ASSUMED EQUAL TO Y'_P

3) SUMMARY

a) DAM

i) PEAK FAILURE OUTFLOW Q_P 36300 CFS

ii) FLOOD STAGE $Y = 0.44\, Y_o \approx 16'$ (JUST D/S FROM DAM)

iii) APPROXIMATE STAGE BEFORE FAILURE $Y_S \approx 3.7'$

iv) APPROXIMATE STAGE AFTER FAILURE $Y_P \approx 20.2$

NEW BRITAIN RESERVOIR DAM

3a - CONT'D) DAM SUMMARY

v) $\Delta Y' = Y_p - Y_s \cong 16.5$ (AT IMMEDIATE IMPACT AREA)

b) DYKE

i) PEAK FAILURE OUTFLOW $Q_p' \cong 8200$ CFS

ii) FLOOD DEPTH $Y' = 0.44 Y_o' \cong 17'$ (IMMEDIATELY D/S FROM DIKE)

iii) APPROXIMATE STAGE AFTER FAILURE AND CHANGE IN STAGE AT IMPACT AREA

$Y_b' \cong \Delta Y \cong 7.1$

PRELIMINARY GUIDANCE
FOR ESTIMATING
MAXIMUM PROBABLE DISCHARGES
IN
PHASE I DAM SAFETY
INVESTIGATIONS

New England Division
Corps of Engineers

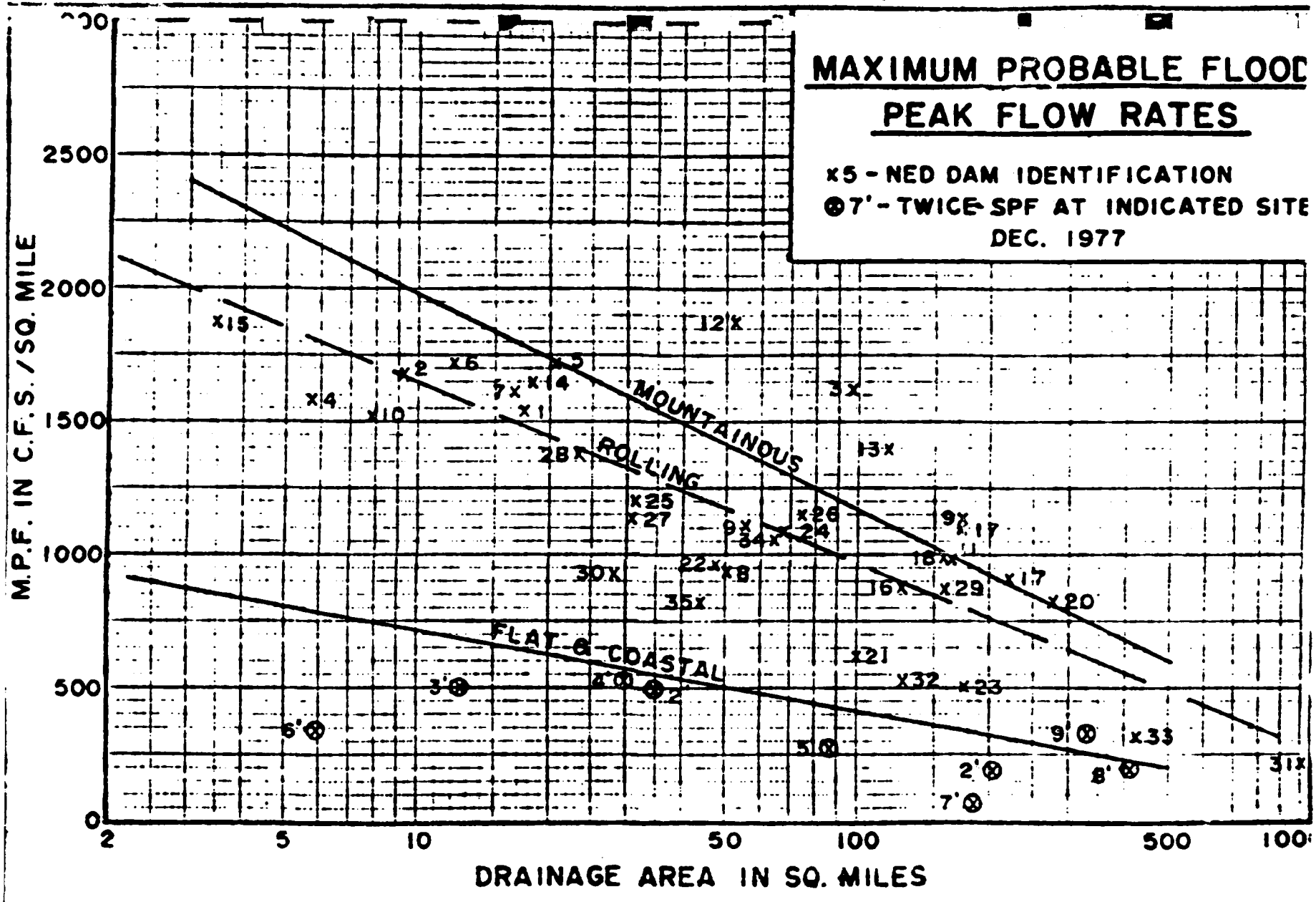
March 1978

MAXIMUM PROBABLE FLOOD INFLOWS
NED RESERVOIRS

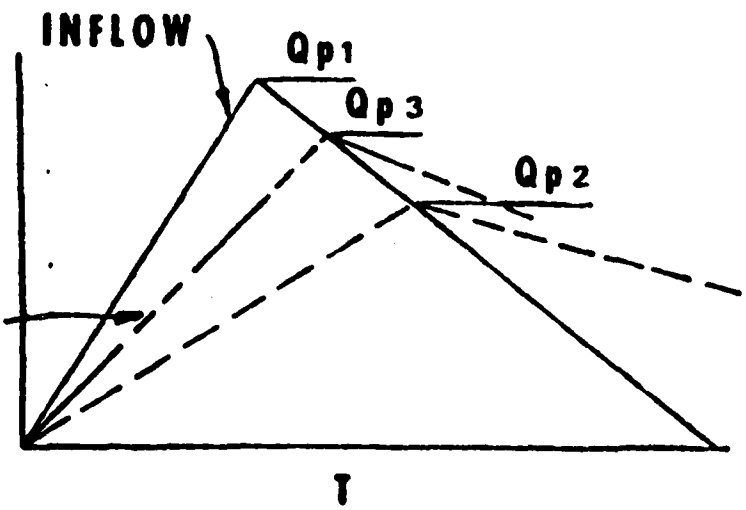
	Project	Q (cfs)	D.A. (sq. mi.)	MPF cfs/sq. mi.
1.	Hall Meadow Brook	26,600	17.2	1,546
2.	East Branch	15,500	9.25	1,675
3.	Thomaston	158,000	97.2	1,625
4.	Northfield Brook	9,000	5.7	1,580
5.	Black Rock	35,000	20.4	1,715
6.	Hancock Brook	20,700	12.0	1,725
7.	Hop Brook	26,400	16.4	1,610
8.	Tully	47,000	50.0	940
9.	Barre Falls	61,000	55.0	1,109
10.	Conant Brook	11,900	7.8	1,525
11.	Knightville	160,000	162.0	987
12.	Littleville	98,000	52.3	1,870
13.	Colebrook River	165,000	118.0	1,400
14.	Mad River	30,000	18.2	1,650
15.	Sucker Brook	6,500	3.43	1,895
16.	Union Village	110,000	126.0	873
17.	North Hartland	199,000	220.0	904
18.	North Springfield	157,000	158.0	994
19.	Ball Mountain	190,000	172.0	1,105
20.	Townshend	228,000	106.0(278 total)	820
21.	Surry Mountain	63,000	100.0	630
22.	Otter Brook	45,000	47.0	957
23.	Birch Hill	88,500	175.0	505
24.	East Brimfield	73,900	67.5	1,095
25.	Westville	38,400	99.5(32 net)	1,200
26.	West Thompson	85,000	173.5(74 net)	1,150
27.	Hodges Village	35,600	31.1	1,145
28.	Buffumville	36,500	26.5	1,377
29.	Mansfield Hollow	125,000	159.0	786
30.	West Hill	26,000	28.0	928
31.	Franklin Falls	210,000	1000.0	210
32.	Blackwater	66,500	128.0	520
33.	Hopkinton	135,000	426.0	316
34.	Everett	68,000	64.0	1,062
35.	MacDowell	36,300	44.0	825

MAXIMUM PROBABLE FLOWS BASED ON TWICE THE STANDARD PROJECT FLOOD (Flat and Coastal Areas)

River	SPF (cfs)	D.A. (sq. mi.)	MPF (cfs/sq. mi.)
1. Pawtuxet River	19,000	200	190
2. Mill River (R.I.)	8,500	34	500
3. Peters River (R.I.)	3,200	13	490
4. Kettle Brook	8,000	30	530
5. Sudbury River.	11,700	86	270
6. Indian Brook (Hopk.)	1,000	5.9	340
7. Charles River.	6,000	184	65
8. Blackstone River.	43,000	416	200
9. Quinebaug River	55,000	331	330


MAXIMUM PROBABLE FLOOD
PEAK FLOW RATES
x5 - NED DAM IDENTIFICATION
⊗7' - TWICE SPF AT INDICATED SITE
DEC. 1977
M.P.F. IN C.F.S./SQ. MILE
DRAINAGE AREA IN SQ. MILES
MOUNTAINOUS
ROLLING
FLAT & COASTAL
2500
2000
1500
1000
500
0
2
5
10
50
100
500
x15
x4
x10
x2
x6
x3
x14
x1
12x
3x
13x
28x
x25
x27
x26
x24
9x
x17
18x
x17
x20
30x
22x
x8
35x
16x
x29
x21
x32
x23
x33
31x
3'⊗
6'⊗
5⊗
9'⊗
2'⊗
8'⊗
7'⊗

ESTIMATING EFFECT OF SURCHARGE STORAGE ON MAXIMUM PROBABLE DISCHARGES



STEP 1: Determine Peak Inflow (Qp_1) from Guide Curves.

STEP 2: a. Determine Surcharge Height To Pass "Qp_1".

b. Determine Volume of Surcharge ($STOR_1$) In Inches of Runoff.

c. Maximum Probable Flood Runoff In New England equals Approx. 19", Therefore

$$Qp_2 = Qp_1 \times \left(1 - \frac{STOR_1}{19}\right)$$

STEP 3: a. Determine Surcharge Height and "$STOR_2$" To Pass "Qp_2"

b. Average "$STOR_1$" and "$STOR_2$" and Determine Average Surcharge and Resulting Peak Outflow "Qp_3".

SURCHARGE STORAGE ROUTING SUPPLEMENT

STEP 3: a. Determine Surcharge Height and "$STOR_2$" To Pass "Qp_2"

b. Avg "$STOR_1$" and "$STOR_2$" and Compute "Qp_3".

c. If Surcharge Height for Qp_3 and "$STOR_{AVG}$" agree O.K. If Not:

STEP 4: a. Determine Surcharge Height and "$STOR_3$" To Pass "Qp_3"

b. Avg. "Old $STOR_{AVG}$" and "$STOR_3$" and Compute "Qp_4"

c. Surcharge Height for Qp_4 and "New $STOR_{Avg}$" should Agree closely

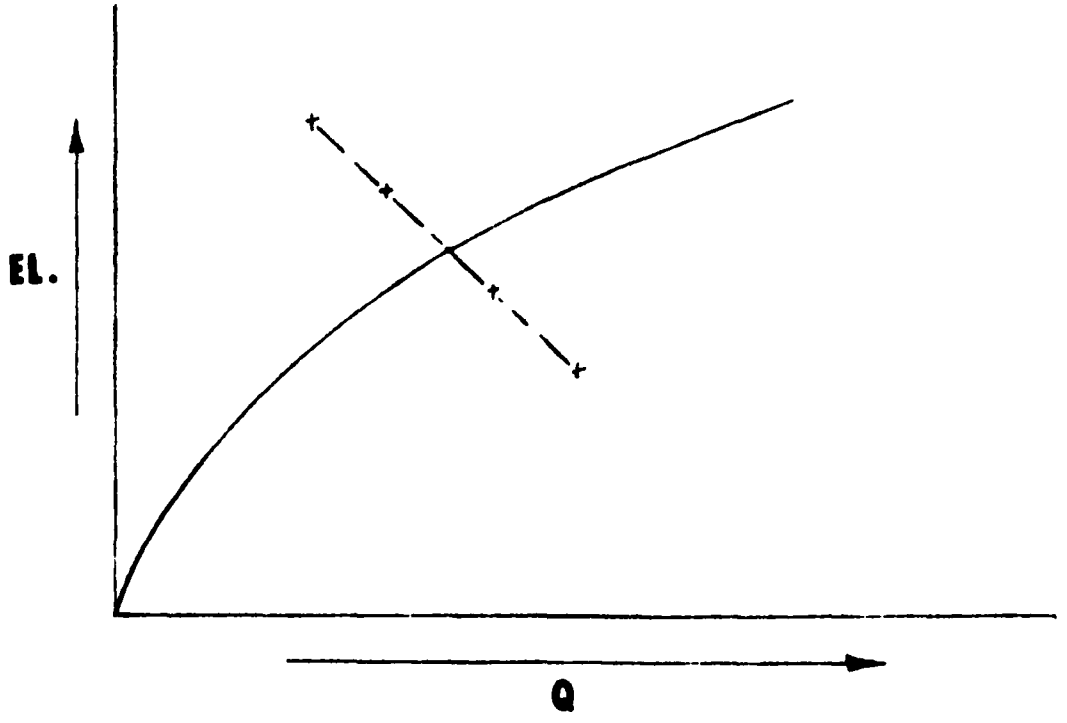
SURCHARGE STORAGE ROUTING ALTERNATE

$$Q_{p2} = Q_{p1} \times \left(1 - \frac{STOR}{19}\right)$$

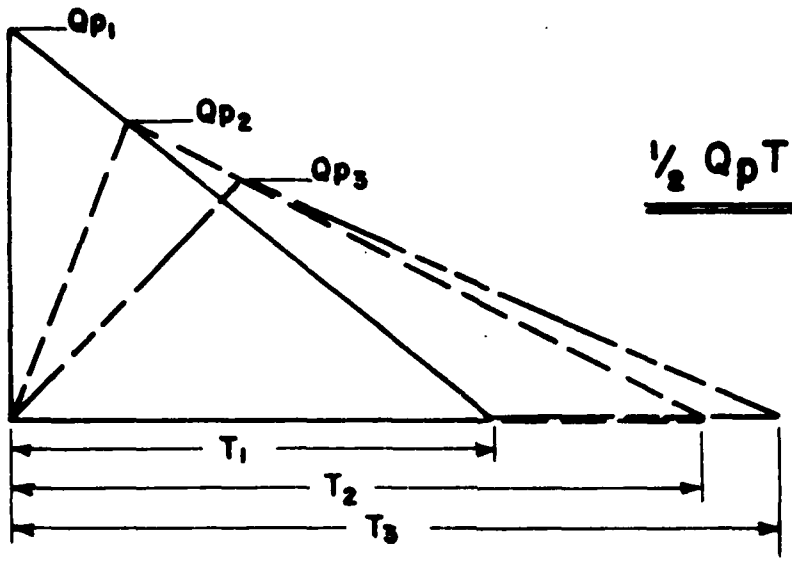
$$Q_{p2} = Q_{p1} - Q_{p1}\left(\frac{STOR}{19}\right)$$

FOR KNOWN Q_{p1} AND 19" R.O.

Q_{p2}	STOR	EL.



"RULE OF THUMB" GUIDANCE FOR ESTIMATING DOWNSTREAM DAM FAILURE HYDROGRAPHS



$\frac{1}{2} Q_p T = 12 S$

STEP 1: DETERMINE OR ESTIMATE RESERVOIR STORAGE (S) IN AC-FT AT TIME OF FAILURE.

STEP 2: DETERMINE PEAK FAILURE OUTFLOW (Q_{p1}).

$$Qp_1 = \frac{8}{27} W_b \sqrt{g} Y_o^{3/2}$$

W_b = BREACH WIDTH - SUGGEST VALUE NOT GREATER THAN 40% OF DAM LENGTH ACROSS RIVER AT MID HEIGHT.

Y_o = TOTAL HEIGHT FROM RIVER BED TO POOL LEVEL AT FAILURE.

STEP 3: USING USGS TOPO OR OTHER DATA, DEVELOP REPRESENTATIVE STAGE-DISCHARGE RATING FOR SELECTED DOWNSTREAM RIVER REACH.

STEP 4: ESTIMATE REACH OUTFLOW (Q_{p2}) USING FOLLOWING ITERATION.

A. APPLY Q_{p1} TO STAGE RATING, DETERMINE STAGE AND ACCOPMANYING VOLUME (V_1) IN REACH IN AC-FT. (NOTE: IF V_1 EXCEEDS 1/2 OF S, SELECT SHORTER REACH.)

B. DETERMINE TRIAL Q_{p2}.

$$Qp_2(\text{TRIAL}) = Qp_1 \left(1 - \frac{V_1}{S}\right)$$

C. COMPUTE V_2 USING Q_{p2} (TRIAL).

D. AVERAGE V_1 AND V_2 AND COMPUTE Q_{p2}.

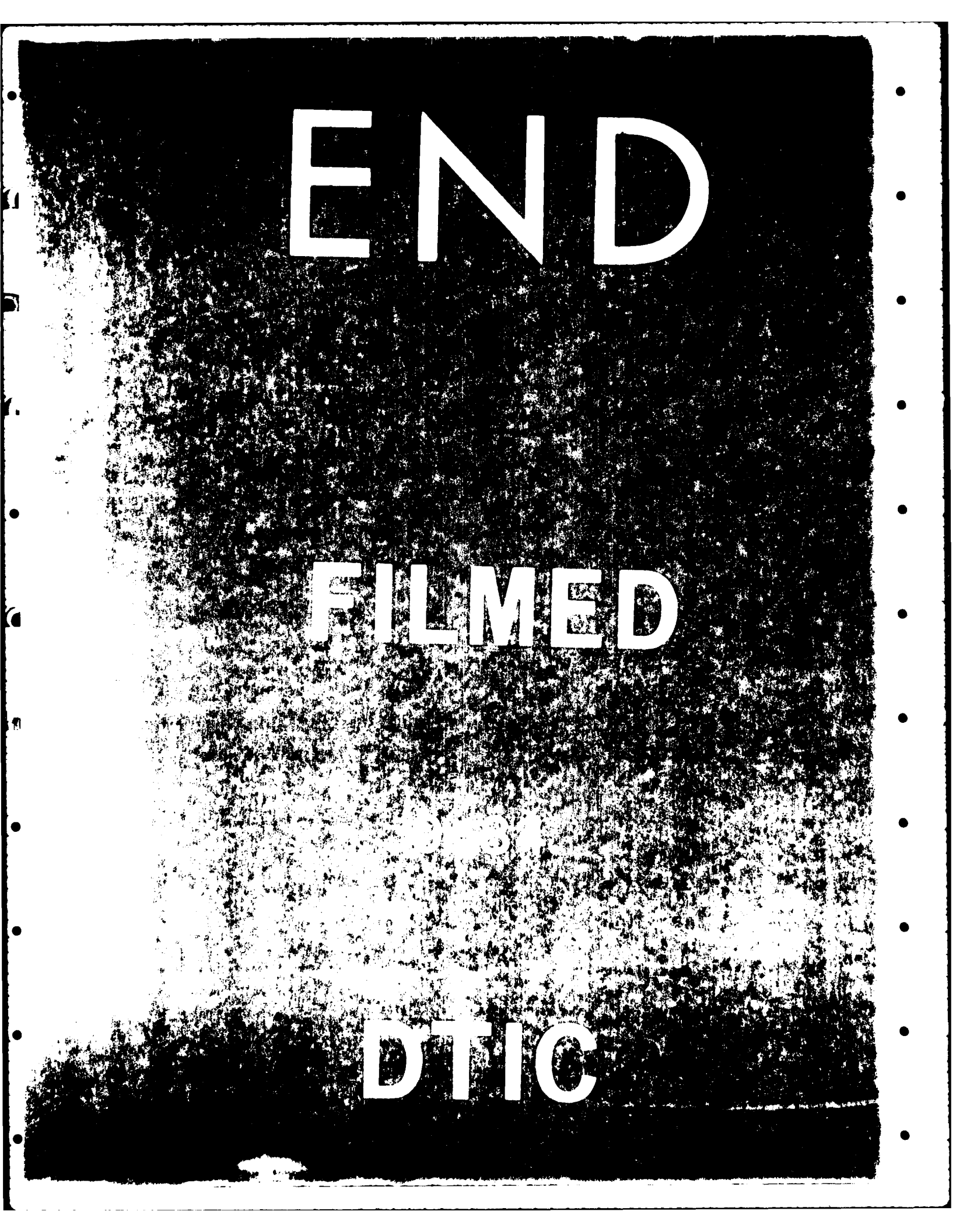
$$Qp_2 = Qp_1 \left(1 - \frac{V_{AVG}}{S}\right)$$

STEP 5: FOR SUCCEEDING REACHES REPEAT STEPS 3 AND 4.

APRIL 1978

APPENDIX E

INFORMATION AS CONTAINED IN THE NATIONAL INVENTORY OF DAMS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